Taylor County Iowa Soils

Soil Survey Series 1947 No. 1

UNITED STATES DEPARTMENT OF AGRICULTURE
and the IOWA AGRICULTURAL EXPERIMENT STATION

COVER PICTURE

The aerial photograph reproduced on the cover of this report shows how a particular locality in Taylor County appears from the air. Persons familiar with the county may recognize the town as Blockton in the southeastern part of the county. The Platte River cuts across the northwestern edge of Blockton. State Highway No. 25 runs north to south on the eastern edge.

In the large bottoms just west of Blockton are large areas of productive Nodaway and Wabash soils. Farther west in the uplands are steeply sloping areas of less productive Gara soils that appear light-colored in the photograph because much of their darker topsoil has been lost by erosion. To prevent such erosion, these areas should have been cropped less intensively and cultivated on the contour. Some probably should have been kept in permanent pasture or timber.

Within the relatively small area (less than 3 miles) shown in the photograph there are no less than 11 different soils. These soils vary greatly as to their slope, erosion, drainage, and fertility. It is important to know and recognize the different soils of Taylor County so that they can be managed in the best possible manner.

(Picture by
Production and Marketing Administration
United States Department of Agriculture)

Soil Survey Series 1947, No. 1

Issued February, 1954

TAYLOR COUNTY, IOWA, SOILS

Field work by

R. G. LEIGHTY, in Charge, and W. H. SCHOLTES
Division of Soil Survey
Bureau of Plant Industry, Soils, and Agricultural Engineering
Agricultural Research Administration
United States Department of Agriculture
C. E. HUTTON, T. H. BENTON, and W. H. FULLER
Iowa Agricultural Experiment Station

Report by

W. H. SCHOLTES, *Soil Scientist*
GUY D. SMITH, *Senior Soil Correlator*
United States Department of Agriculture
and
F. F. RIECKEN, *Research Professor of Soils*
Iowa Agricultural Experiment Station

Area inspected by

GUY D. SMITH, *Senior Soil Correlator*, Division of Soil Survey

(The Division of Soil Survey was transferred to Soil Conservation Service November 15, 1952)

UNITED STATES DEPARTMENT OF AGRICULTURE

In cooperation with the

IOWA AGRICULTURAL EXPERIMENT STATION

How to Use THE SOIL SURVEY REPORT

FARMERS who have worked with their soils for a long time know about the soil differences on their farms and perhaps on the farms of their immediate neighbors. What they do not know, unless soil surveys have been made, is how nearly their soils are like those at experiment stations or on other farms, either in their State or other States, where farmers have gained experience with new or different farming practices or farm enterprises. They do not know whether higher yields obtained by farmers in other parts of their county and State are from soils like theirs or from soils so different that they could not hope to get yields as high, even if they followed the same practices. One way for farmers to avoid some of the risk and uncertainty involved in trying new production methods and new varieties of plants is to learn what kinds of soils they have so that they can compare them with the soils on which new developments have proved successful.

SOILS OF A PARTICULAR FARM

The soil map is in the envelope inside the back cover. To find what soils are on any farm or other land, it is necessary first to locate this land on the map. This is easily done by finding the township, section, and quarter section in which the farm is located and by using landmarks such as roads, streams, villages, dwellings, and other features to locate the boundaries.

Each kind of soil mapped within the farm or tract is marked on the map with a symbol. For example, all the areas marked WM are Winterset silty clay loam, 0–1% slopes. The color in which the soil area is shown on the map will be the same as the color indicated in the legend for the particular type of soil. If you want information on the Winterset soil turn to the section in this publication on Soils of Taylor County, Their Use and Management. Under this heading you will find a statement of what the characteristics of this soil are, what the soil is mainly used for, and some of the uses to which it is suited.

Suppose, for example, you wish to know how productive Winterset silty clay loam, 0–1% slopes is. You will find the soil listed in table 3. Opposite the name you can read yields for the different crops grown on the soil. This table also gives estimated yields for all other soils mapped in the county.

If you want to know what uses and management practices are recommended for Winterset silty clay loam, 0–1% slopes, read what is said about this soil in the section on Soils of Taylor County, Their Use and Management, and in table 2.

SOILS OF THE COUNTY AS A WHOLE

A general idea of the soils of the county is given in the section on Know Your Soils and Plan Their Use and Management. After reading this section study the soil map and notice how the different kinds of soils tend to be arranged in different parts of the county. These patterns are likely to be associated with well-recognized differences in type of farming, land use, and land-use problems.

A newcomer to the county, especially if he considers purchasing a farm, will want to know about the climate as well as the soils; the sizes of farms; the principal farm products; availability of highways and railroads; and population characteristics. Information on all of these will be found in the sections on General Features of Taylor County.

Those interested in how the soils of the county were formed and how they are related to the great soil groups of the world should read the section on Formation and Classification of Taylor County Soils.

This publication on the soil survey of Taylor County, Iowa, is a cooperative contribution from the—

SOIL CONSERVATION SERVICE
and the
IOWA AGRICULTURAL EXPERIMENT STATION

CONTENTS

KNOW YOUR SOILS AND PLAN THEIR USE AND MANAGEMENT

THE report on the Taylor County soil survey has been written primarily for farmers of the county. The soil map and the descriptions of the soil units are based on a detailed survey made almost acre by acre by men trained in the science of soil classification. Recommendations for use and management are based on research and the experience of farmers.

Located in southwestern Iowa, Taylor County is mainly agricultural (fig. 1). In 1949, 176,526 acres were used for cropland and 127,152 acres for pasture. Many acres in cultivated crops could be better used for permanent pasture, and some cultivated areas need improved management if efficient crop production is to continue.

A total of 35 soils are mapped and described, each requiring different management from most of the others if it is to give the best returns now and in the years to come. What crops are adapted to each soil? What treatment does each soil need? This report attempts to answer these and other questions for the farmers and landowners of Taylor County.

EXAMINE THE SOIL MAP

Note letters and names of the soil units.—If the soil map is used to locate a specific tract of land, the letter symbols appearing on the map and soil names appearing in the map legend should be noted. The letter symbols, for example, Wm or B, refer to the different soil units on the map. The name and symbol of each is listed in the map legend. A discussion of each soil mapping unit is given in the report.

Colors are a guide to general soil conditions.—Shades of green are used for the nearly level to gently sloping soils not subject to serious erosion; shades of yellow indicate areas subject to moderate erosion; and shades of blue indicate areas having serious erosion. In general, the darker the blue the more serious the erosion problem.

HOW DO TAYLOR COUNTY SOILS DIFFER?

Entire soil profile is important.—The soil is expected to furnish essential plant nutrients, oxygen, and water to the plant roots, in addition to providing anchorage. Its ability to serve these functions

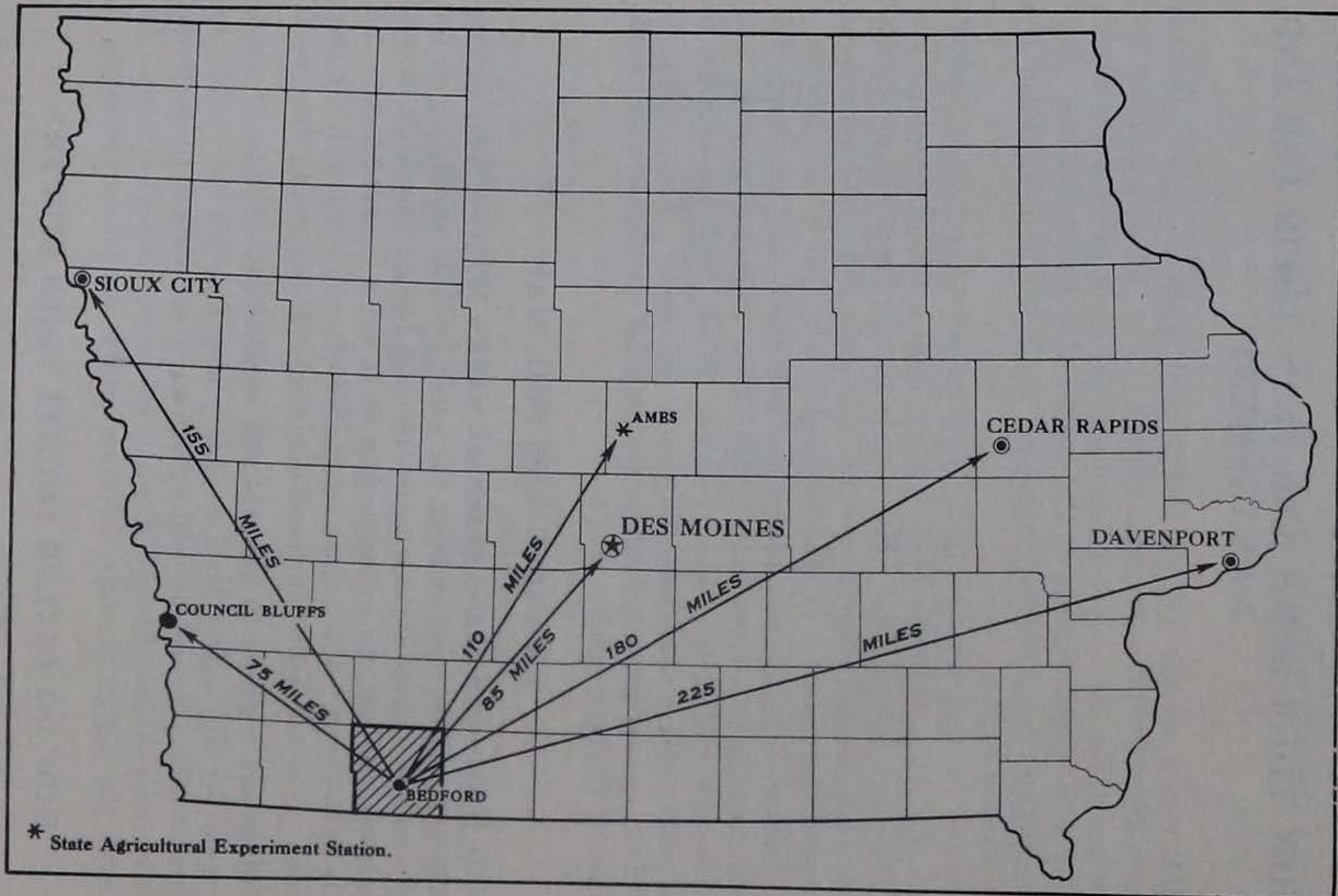


FIGURE 1.—Location of Taylor County in Iowa.

depends on the chemical and physical properties of all the layers as deep as plant roots commonly go. For most crops the significant depth is about 4 to 6 feet.

If you dig a pit or examine a road cut in an area of Sharpsburg soil, you will notice a succession of layers differing from each other. The surface foot is the darkest. Below that you will see a browner layer, called the subsoil. Below about 3 feet, there is another layer which is brown in color, but is splotched with various shades of gray, brown, and red. You will find roots most abundant in the surface foot. There will also be some roots down to 4 or 5 feet if you look for them in the late summer. This is a soil which water, air, and roots can penetrate readily.

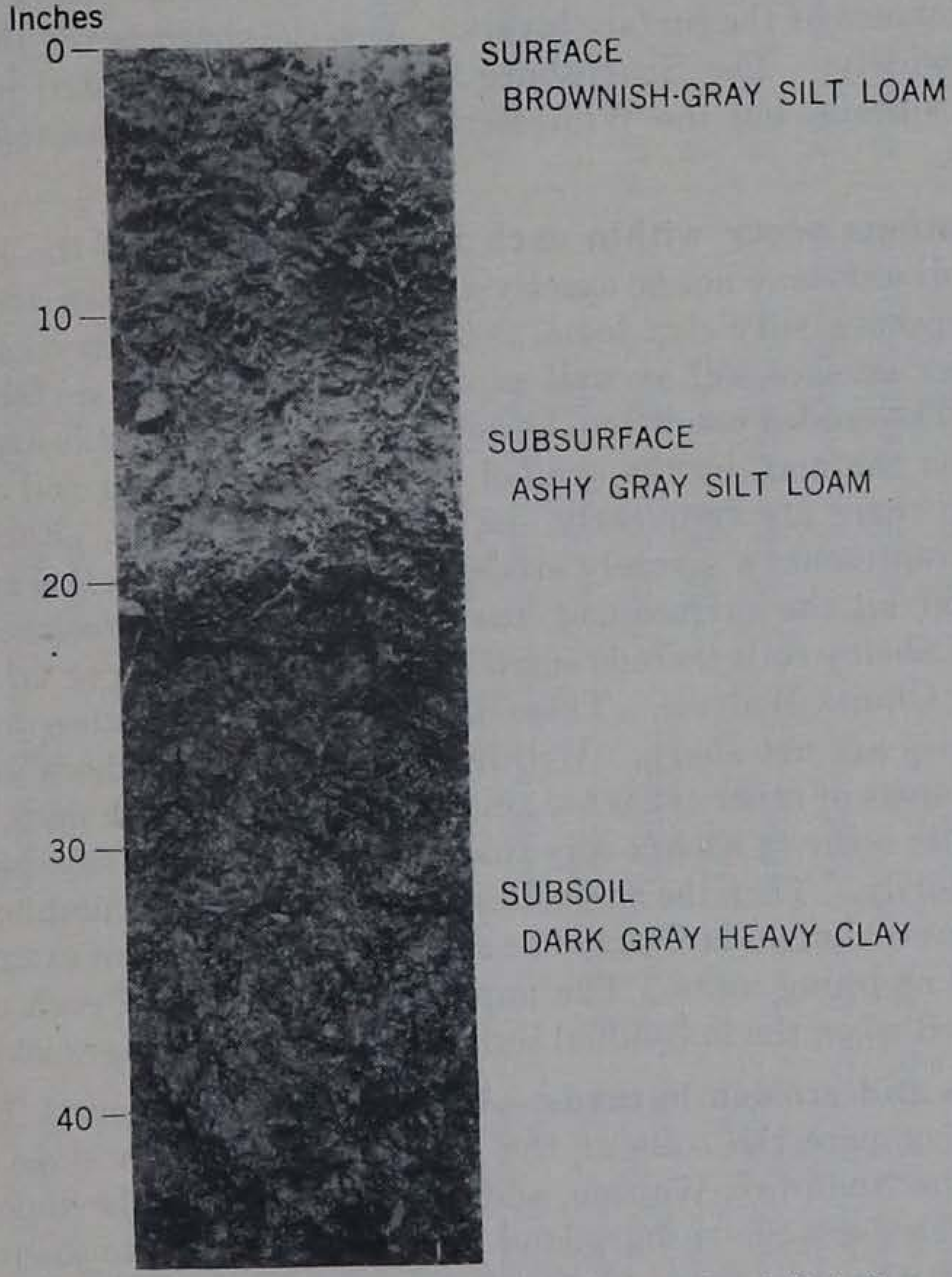


FIGURE 2.—Humeston silt loam to a depth of 40 inches.

If you dig a pit in an area of Humeston silt loam you will find a different sequence of layers. Figure 2 shows what Humeston silt loam looks like to a depth of 40 inches. The surface is a brownish-gray silt loam, about 9 inches thick. Below that, from 9 to 13 inches, is usually a light-gray silt loam, with much the color and feel of wood ashes. The subsoil is a very dark gray heavy clay, hard when dry and very plastic and sticky when wet. You will find very few or no roots below the surface 9 inches in this soil. Because the subsoil is not easily penetrated by water, the soil is often waterlogged and air is excluded. Roots of most plants will not grow in the absence of air.

Other soils in the county have differences, too. In the description of each soil unit these differences are noted and their best use discussed. You can compare Taylor County soils conveniently by referring to table 1. Here the major characteristics of each soil unit are listed. You will note that there are wide variations in the color and thickness of the surface layers. Also the character of the subsoil varies widely. The Sharpsburg soils have well aerated brownish-yellow subsoils, but the Winterset soils have poorly aerated grayish subsoils.

Variations occur within each mapping unit.—All the land in a given soil unit may not be exactly alike. For example, an area shown as Sharpsburg silty clay loam, 2–6% slopes, eroded, may have spots of deeper surface soil as well as areas where all the surface soil is gone. The eroded condition, however, is dominant in this area and is shown on the map by the symbol Rᴅ. Within certain soil areas on the map there are frequently one or more S symbols. Each S soil symbol represents a severely eroded area of 5 acres or less and indicates that all the surface soil has been removed by erosion. Often areas of Shelby soils include small areas of Sharpsburg or other soils, such as Olmitz-Wabash. These inclusions occur because most soil boundaries are not sharp. Within a given soil unit there are often distinct areas of other types too small to be shown on the map. Sometimes soils occur in such a way that it is impossible to separate them satisfactorily. Then the two soils may be mapped as a complex. The complexes of Lagonda-Clarinda and Olmitz-Wabash are examples of such soil mapping units. The important variations of each unit are mentioned when the individual soils are discussed on pages 26 to 53.

Slopes and erosion hazards.—In table 1 and in figure 3 it is possible to compare the soils of the county according to slope. Soils such as the Nodaway, Wabash, and Winterset have little slope; other soils, as the Gara, Sharpsburg, and Shelby, have gentle to steep slopes. Generally, the steeper the slope, the greater the tendency of the soil to erode and the greater the need to protect the surface soil from water erosion. For example, a 9-percent slope will erode about twice as fast as a 5-percent slope, if crop and other treatments are equal. A

TABLE 1.—*Taylor County, Iowa, soils: Summary of important characteristics and properties*

Map symbol	Soil	Organic-matter content	Usual surface soil depth	Permeability of subsoil	Workability [1]	Wetness hazard [2]	Erosion hazard [3]
			Inches				
B	Blockton silt loam, 0–1% slopes.	Medium	15	Slow to very slow	Fair	Severe	None.
CA	Clearfield silty clay loam, 2–6% slopes.	High	10–14	Moderate to slow	do	do	Severe.
CB	Clearfield silty clay loam, 2–6% slopes, eroded.	Medium	3–9	do	do	do	Do.
GA	Gara silt loam, 7–11% slopes.	do	8–10	Slow	Fair to good	None	Very severe.
GB	Gara silt loam, 7–11% slopes, eroded.	Low	2–8	do	Fair	do	Do.
GC	Gara silt loam, 12–16% slopes.	Medium	8–10	do	Fair to poor	do	Do.
GD	Gara silt loam, 12–16% slopes, eroded.	Low	2–8	do	do	do	Do.
GE	Gara silt loam, 17–30% slopes.	Medium	7–9	do	[4]	do	Do.
GF	Gara silt loam, 17–30% slopes, eroded.	Low	2–7	do	[4]	do	Do.
GY	Gravity silty clay loam, 2–6% slopes.	High	12–16	Moderate to slow	Good	Slight	None.
H	Humeston silt loam, 0–1% slopes.	Medium	15	Slow to very slow	Fair to poor	Severe	Do.
LA	Ladoga silt loam, 2–6% slopes.	do	9–12	Moderate to slow	Good	None	Slight.
LB	Ladoga silt loam, 2–6% slopes, eroded.	Low	3–9	do	do	do	Do.
LC	Ladoga silt loam, 7–11% slopes.	Medium	9–11	do	Good to fair	do	Severe.

See footnotes at end of table.

TABLE 1.—*Taylor County, Iowa, soils: Summary of important characteristics and properties*—Continued

Map symbol	Soil	Organic-matter content	Usual surface soil depth	Permeability of subsoil	Workability [1]	Wetness hazard [2]	Erosion hazard [3]
			Inches				
LD	Ladoga silt loam, 7–11% slopes, eroded.	Low	3–9	Moderate to slow	Fair	None	Severe.
MA	Lagonda-Clarinda complex, 7–11% slopes.	Medium	9–12	Very slow	Poor	Severe to very severe.	Very severe.
MB	Lagonda-Clarinda complex, 7–11% slopes, eroded.	Low	3–9	do	do	do	Do.
MC	Lagonda-Clarinda complex, 12–16% slopes.	Medium	8–11	do	do	do	Do.
MD	Lagonda-Clarinda complex, 12–16% slopes, eroded.	Low	3–9	do	do	do	Do.
N	Nodaway silt loam, 0–2% slopes.	Medium	20	Moderate to slow	Good to poor	Slight to severe	None.
OW	Olmitz-Wabash complex, 2–6% slopes.	Very high	20–24	do	do	do	Gully hazard.
RA	Sharpsburg silty clay loam, 0–2% slopes.	High	16	do	Good	None	None.
RB	Sharpsburg silty clay loam, 2–6% slopes.	Medium high	10–14	do	do	do	Slight.
RC	Sharpsburg silty clay loam, 2–6% slopes, bench position.	do	10–14	do	do	do	Do.
RD	Sharpsburg silty clay loam, 2–6% slopes, eroded.	Medium low	3–10	do	do	do	Do.
RE	Sharpsburg silty clay loam, 7–11% slopes, eroded.	do	3–10	do	Good to fair	do	Severe.

SA	Shelby silt loam, 7–11% slopes.	Medium	8–10	Slow	do	do	Very severe.
SB	Shelby silt loam, 7–11% slopes, eroded.	Low	5–8	do	Fair	do	Do.
SC	Shelby silt loam, 12–16% slopes.	Medium	8–10	do	Fair to poor	do	Do.
SD	Shelby silt loam, 12–16% slopes, eroded.	Low	2–8	do	do	do	Do.
SE	Shelby silt loam, 17–30% slopes, eroded.	do	2–7	do	(4)	do	Do.
WA	Wabash silty clay loam, 0–1% slopes.	Very high	24	Slow to very slow	Good to poor	Slight to severe	None.
WB	Wabash silty clay, 0–1% slopes.	do	18	do	Fair to poor	Very severe	Do.
WM	Winterset silty clay loam, 0–1% slopes.	do	16	Moderate to slow	Fair to good	Slight to severe	Do.
WN	Winterset silty clay loam, 0–1% slopes, bench position.	do	16	do	do	do	Do.

1 Depends on slope, erosion, and texture, structure, and organic-matter content of the surface soil.

2 Refers to presence of excessive moisture that would reduce corn yields.

3 Rotation assumed to be corn, corn, oats, and meadow without contouring, terracing, or strip cropping.

4 Soil too steep for cultivation.

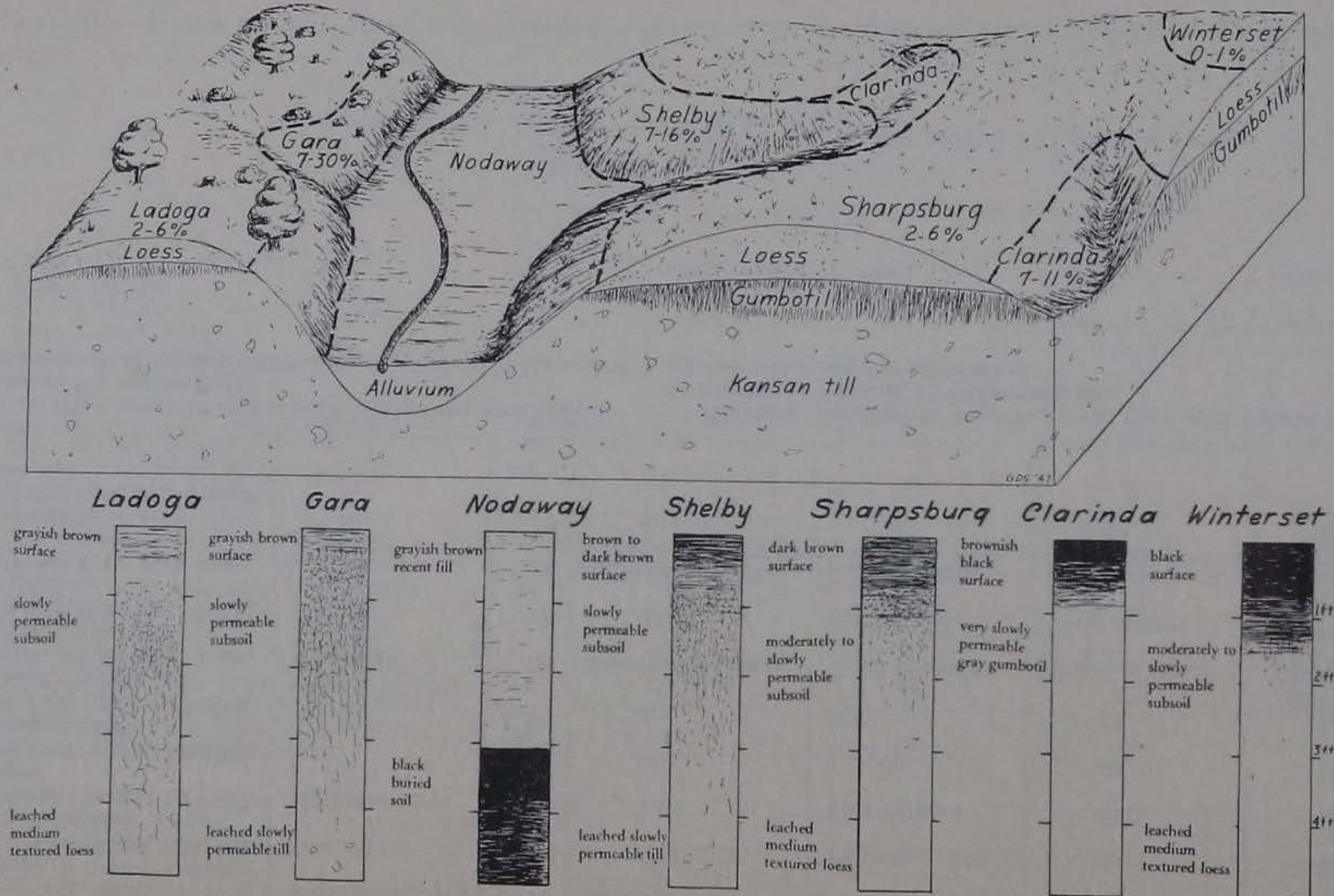


FIGURE 3.—Explanation on facing page.

5-percent slope on one soil may erode more rapidly than the same slope on a different soil type. The slope of each soil unit may be compared in table 1 with its erosion-hazard rating when planted to intertilled crops.

Permeability of subsoil is very important.—The supply of nutrients and the tilth of the surface layer are very important when the crops are small, but the subsoil must also furnish some nutrients and a great deal of water if the plants are to reach harvest stage. If air and water move downward through the subsoil readily, the subsoil is said to be rapidly or moderately permeable. If the subsoil is slowly permeable it often becomes filled with water that excludes the oxygen of the air. When the subsoil is waterlogged, the roots of most plants cannot enter, and if they are already present they may be killed. Even though the roots survive in the absence of oxygen they cannot absorb many of the nutrients the plant needs. Slow or very slow subsoil permeability is therefore an undesirable characteristic of soils. Because permeability cannot be seen, it is stressed in figure 3, table 1, and in the text of the report. Not all wet soils have slowly permeable subsoils. Winterset soils were originally wet, but water will move through the subsoil, and tile drains are effective. In contrast, Blockton soil has slowly to very slowly permeable subsoil, and tile drains therefore are not very effective. Clarinda, Gara, Lagonda, and Shelby subsoils are slowly or very slowly permeable and permit very small amounts of water to move through them. Sharpsburg soils have the most desirable subsoil of all the soils in the county.

Color and thickness of surface layers vary.—The soils of Taylor County vary widely in the content of organic matter. Winterset, Wabash, Gravity, and Olmitz soils have large amounts of organic matter and dark surface layers, usually 16 to 20 inches thick. Ladoga soils are low in organic matter, with the eroded units the lowest. Sharpsburg soils vary from high to low in organic-matter content, chiefly because of erosion. Generally, the lower the organic-matter

---

EXPLANATION OF FIGURE 3

Diagram showing how the most important upland soils in Taylor County occur with relation to one another. The slopes that these soils most generally occupy are indicated underneath the soil name. Native vegetation is shown by clumps of grass (prairie) or tree stumps (timber). Areas shown with both grass and trees indicate an original mixture of grass and trees. The material from which the different soils developed is also shown by the diagram. Note that the Ladoga, Sharpsburg, and Winterset soils have developed from loess, the Shelby and Gara soils from glacial till, and the Clarinda soils from gumbotil.

The appearance of the different soils is shown by the larger scale drawings in the lower part of the figure. The darker shading in the soils is caused by organic matter. The thickness of the soil layers is indicated, and also how permeable the subsoil is to water.

content, the greater the need for legumes in the rotation to supply organic matter and nitrogen (see Management System II in table 3). The quantity of organic matter in the surface layer therefore is important in selecting the rotation. The relative amounts of organic matter are shown in table 1.

The treatment should fit the soil.—Many soil properties affect the yields obtained. It is important to recognize the specific problems of each soil. Some soil properties can be changed for the better. For example, soil acidity can be corrected by adding lime so that alfalfa can be grown. Some naturally wet soils, such as the Winterset, can be tile-drained to improve soil aeration. Fertilizer can be added, especially to the eroded Shelby and Gara soils, to correct the deficiency of phosphorus.

Other soil properties are not easily changed. For example, the slope and the physical character of the subsoil are more or less permanent features. Contour cultivation, combined with a proper rotation, is effective in controlling erosion and increasing crop yields on Sharpsburg soils, but the same practices may aggravate the wetness of Clarinda and Lagonda soils because they have very slow subsoil permeability. In these last-named soils the dense very slowly permeable subsoil limits their productivity and use. Plant roots penetrate their subsoil very little. Contouring may increase the wet conditions because only a small quantity of water can move into the subsoil. Other soils have steep slopes or properties that limit their use for corn. Shelby, Lagonda, and Clarinda soils have sticky plastic subsoils which, when exposed by erosion, are difficult to work down into good seedbeds. They become very unproductive for crops when severely eroded. It is therefore important to recognize the deficiency of each soil and not attempt to treat them all alike.

COMPARE PRESENT USE OF SOILS WITH SUGGESTED USE

After you have identified the soils that occur on your farm by examining the soil map, and have learned the characteristics that affect their use, study carefully the suggestions for their use and management. This information is given for each of the different soils in the county on pages 26 to 53. A summary of the suggested rotations and other treatments is given in table 2.

Compare some of the suggested rotations for different soils. For example, the following suggested rotation for Winterset soil includes a high proportion of corn: 2 years of corn, 1 year of oats, and 1 year of legumes. For Shelby soil with 7- to 11-percent slopes the suggested rotation is 1 year of corn and 1 year of oats, followed by 3 years of legume-grass meadow.

As corn is the main crop harvested you will doubtless wish to have the largest possible acreage in corn that will not harm the soil and that at the same time will give high yields.

Corn can be grown more often on some soils than others.—We considered two important points in selecting the suggested rotations for the different soils: (1) Will the rotations over a period of years give as high yields of corn as should be obtained from the particular soil and (2) are the rotations practical? The rotations suggested in table 2, if combined with other good management practices, will give high yields per acre and the maximum of grain and feed crops consistent with long-time use of the soil.

The combinations of rotations and erosion control practices in table 2 are based on the principle that sod crops and contour-terrace practices supplement each other in controlling erosion. Where contouring and terracing are used, more intertilled crops can be grown but additional nitrogen fertilizer or manure may be needed. However, different combinations suggested for any one soil will give about the same yields.

Obviously, in some instances the suggested rotations cannot be followed without change. Nor is it necessary to follow them without revision. Experience and research show, however, that if the sloping soils are to be protected from excessive erosion, the maximum proportion of corn in the rotation should approximate that suggested in table 2. Obviously, you have to decide how closely the suggested rotation is to be followed for each soil on your farm. The plan of rotation will necessarily be based on the way the land has been cropped and managed in the past and on future desires, as well as on kind of soil.

The area of the different soils on the farm will also determine to a large extent whether the suggested maximum corn rotations can be followed. Many fields contain two or more soils that call for different rotations. When the area of one soil is very small, it is often necessary to farm it in the same way as the major soil or soils of the field. Sometimes the areas of the different soils are large enough that rotations can be split or boundaries of fields rearranged to allow each soil its best permanent use.

What yields can be expected if the suggested management is followed?—High yields of crops are the result of good soil and good soil management. Low yields may be caused by a poor soil, by trying to grow crops not adapted to the soil, or by faulty soil management.

Estimated yields of various crops are given in table 3. Two systems of soil management were used in preparing them. In one system (No. I) the land is largely in grain crops or unimproved pasture. There is no definite rotation of crops, but corn and oats are the main

TABLE 2.—*Suggested treatments and rotations for soils of Taylor County, Iowa*

Map symbol	Soil	Common fertilizer and lime needed [1]	Suggested combinations of rotations and erosion control practices [2]			Primary management problems
			Without contour or terrace practices	With contour practices for corn	With contour and terrace practices [3]	
B	Blockton silt loam, 0–1% slopes.	Lime, phosphate, and potash.	CSOM, CO (SCL)	([4])	([4])	Surface drainage.
CA	Clearfield silty clay loam, 2–6% slopes.	do	COMM	CCOMM [5]	CCOM [5]	Seepage and erosion control.
CB	Clearfield silty clay loam, 2–6% slopes, eroded.	do	COMM	CCOMM [5]	CCOM [5]	Do.
GA	Gara silt loam, 7–11% slopes.	do	COMMM, OMMMM, T.	COMM	CCOMM	Erosion control and low fertility level.
GB	Gara silt loam, 7–11% slopes, eroded.	do	OMMMM, PP, T	COMMM	COMM	Do.
GC	Gara silt loam, 12–16% slopes.	do	OMMMM, PP, T	COMMM	([6])	Do.
GD	Gara silt loam, 12–16% slopes, eroded.	Lime and phosphate	OMMMM, PP, T	([4])	([4])	Do.
GE	Gara silt loam, 17–30% slopes.	do	PP, T	([4])	([4])	Do.
GF	Gara silt loam, 17–30% slopes, eroded.	do	PP, T	([4])	([4])	Do.
GY	Gravity silty clay loam, 2–6% slopes.	Lime	CSOM, CO (SCL), CCOM, CSO (SCL).	([4])	([4])	Maintenance of fertility.
H	Humeston silt loam, 0–1% slopes.	Lime, phosphate, and potash.	CSOM, PP	([4])	([4])	Surface drainage.
LA	Ladoga silt loam, 2–6% slopes.	do	CCOMMM, COMM	CCOMM	CCOM	Erosion control and fertility maintenance.
LB	Ladoga silt loam, 2–6% slopes, eroded.	do	CCOMMM, COMM	CCOMM	CCOM	Do.

Lc	Ladoga silt loam, 7–11% slopes.	do	CCOMMM, COMM	COMM	CCOMM	Do.
Ld	Ladoga silt loam, 7–11% slopes, eroded.	do	COMMM, OMMM	COMM	CCOMM	Do.
Ma	Lagonda-Clarinda complex, 7–11% slopes.	do	COMMM, OMMM	COMM [5]	COMM [5]	Seepage and erosion control; low fertility.
Mb	Lagonda-Clarinda complex, 7–11% slopes, eroded.	Lime and phosphate	OMMM	[4]	[4]	Do.
Mc	Lagonda-Clarinda complex, 12–16% slopes.	do	OMMM	[4]	[4]	Do.
Md	Lagonda-Clarinda complex 12–16% slopes, eroded.	do	OMMM	[4]	[4]	Do.
N	Nodaway silt loam, 0–2% slopes.	[7]	CSOM, CCOM, CSO (SCL), PP, T.	[4]	[4]	Surface drainage and protection from overflow.
OW	Olmitz-Wabash complex, 2–6% slopes.	Lime	P, CCOM	[4]	[4]	Gully erosion control.
Ra	Sharpsburg silty clay loam, 0–2% slopes.	do	CCOM, CO (SCL)	[4]	[4]	Erosion control.
Rb	Sharpsburg silty clay loam, 2–6% slopes.	Lime and phosphate	COM, COMM	CCOMM	CCOM	Do.
Rc	Sharpsburg silty clay loam, 2–6% slopes, bench position.	do	COM, COMM	CCOMM	CCOM	Do.
Rd	Sharpsburg silty clay loam, 2–6% slopes, eroded.	do	COMM	CCOMM	CCOM	Erosion control and fertility maintenance.
Re	Sharpsburg silty clay loam, 7–11% slopes, eroded.	do	COMMM	CCOMMM	CCOMM	Do.
Sa	Shelby silt loam, 7–11% slopes.	Lime, phosphate, and potash.	COMMM	COMM	CCOMM	Do.
Sb	Shelby silt loam, 7–11% slopes, eroded.	do	OMMM	COMMM	COMM	Do.
Sc	Shelby silt loam, 12–16% slopes.	Lime and phosphate	PP, OMMMM	COMMM	[6]	Do.

See footnotes at end of table.

988972—54——2

TABLE 2.—*Suggested treatments and rotations for soils of Taylor County, Iowa*—Continued

Map symbol	Soil	Common fertilizer and lime needed [1]	Suggested combinations of rotations and erosion control practices [2]			Primary management problems
			Without contour or terrace practices	With contour practices for corn	With contour and terrace practices [3]	
SD	Shelby silt loam, 12–16% slopes, eroded.	Lime and phosphate	PP, OMMMM	(4)	(4)	Erosion control and fertility maintenance.
SE	Shelby silt loam, 17–30% slopes, eroded.	do	PP	(4)	(4)	Do.
WA	Wabash silty clay loam, 0–1% slopes.	(7)	CSOM, CCOM, CSO (SCL).	(4)	(4)	Surface drainage and overflow protection.
WB	Wabash silty clay, 0–1% slopes.	Phosphate and potash.	CSOM, PP, CSO (SCL).	(4)	(4)	Do.
WM	Winterset silty clay loam, 0–1% slopes.	(7)	CSOM, CCOM, COM, CO (SCL), CSO (SCL).	(4)	(4)	Surface and subsoil drainage.
WN	Winterset silty clay loam, 0–1% slopes, bench position.	(7)	CSOM, CCOM, COM, CO (SCL), CSO (SCL).	(4)	(4)	Do.

[1] This column lists the most common fertility needs. Soil tests will provide more specific information on kind and amount of fertilizer. Lime and phosphate are applied before seeding legumes; potash and phosphate are applied in the row for corn; and nitrogen fertilizer may be desirable on oats.

[2] Crops included in rotations and alternative uses are indicated by the letters C, S, O, (SCL), M, PP, and T. C=corn, S=soybeans, O=oats, (SCL)=sweetclover catch crop, M=meadow of mixed legumes and grasses, PP=permanent pasture, and T=timber. It is assumed that the maximum quantity of corn is desired. For best corn yields in all rotations with 2 years of corn, nitrogen fertilizer, manure, or both should be applied on the second-year corn.

[3] Graded terraces are generally recommended for Taylor County.

[4] Contouring and terracing are usually not recommended for relatively level or pastured areas.

[5] Contour rows should be on a grade, and the gradient of terrace channels should be increased to provide drainage on these soils.

[6] Terraces are not recommended for slopes of more than 12 percent.

[7] No general recommendation; use tests to determine needs.

grain crops, soybeans are grown occasionally, and no more often than about every tenth year the land is seeded to clover and timothy meadow. No lime or fertilizers are used. In the other system (No. II) it is assumed that limestone and fertilizers are used as need is shown by soil tests, and that the operator follows one of the combinations of rotation and erosion control practices suggested in table 2.

The yield estimates in table 3 were compiled from a number of sources and represent what is thought to be a fairly reliable average of yields that can be expected for the next few years. Improved varieties, better fertilizer practices, or other improved farming practices may make it possible to obtain higher yields than the estimates given. On the other hand, new plant diseases or insect pests may result in reduced yields. As additional yield data become available, new estimates will be prepared.

The yield estimates can be used as a check on the adequacy of present systems of management. If the average of your yields for the past 5 to 10 years is less than those estimated for your soils under management system II, you should examine your management system and cropping practices carefully. The chances are that you can increase your yields by making changes in your practices. Study of the sections on the use and management of the individual soils, pages 26 to 53, and the discussion of soil management on pages 20 to 25 may suggest the changes which you could make to advantage.

Another use of the yield estimates is to determine which management systems will give the greatest net production after deducting the costs of necessary soil treatments. You can, for example, compare your present average yields with those predicted for the suggested managements systems. The comparison will show whether the increased yields will pay the costs of any additional liming and fertilizing that may be needed. In making such a comparison you should use the average yields you have obtained during the past 5 years or more. The yields fluctuate so much with the weather that it is not safe to use averages of yields obtained for only 2 or 3 years.

The yield estimates can also be used to pick out the fields on which a soil improvement program should be started first. Crops show a greater response to good management on some soils than they do on others. For example, corn yields on Winterset soils show a difference between management systems I and II of 25 bushels, but only 10 bushels difference on Shelby soil with 12- to 16-percent slopes. Therefore a farmer with fields of both Winterset and Shelby soils and having limited funds for soil improvement would do best to start his improvement on the Winterset soils. The increased grain yields on the Winterset soils might make it possible to retire the Shelby areas from grain without upsetting the crop and feeding program on the farm. This would simplify soil management of the farm as a whole.

TABLE 3.—*Estimated yield of crops to be expected over a 5- to 10-year period from Taylor County, Iowa, soils under two management systems*

[Management System No. I: Grain crops occupy the level and gently sloping soils most of the time, but are not grown in a definite rotation; clovers are produced less than 1 year in 10. No lime or commercial fertilizer is used. The pastures are unimproved bluegrass and brushy timber. (The steeper areas of Gara and Shelby soils are generally used for pasture; the level and gently sloping soils are heavily cropped.)

Management System No. II: Crop rotations and erosion control practices are combined for each soil according to the suggestions in table 2. Lime and commercial fertilizers are used wherever soil tests indicate a need for them. Cropland is manured at least once every 5 years. Pastures consist of legume-grass mixtures (usually alfalfa-bromegrass), and are fertilized and reseeded as often as necessary for good legume growth. Nitrogen from commercial fertilizer may be more economical than that from legumes, but legumes may be needed to maintain tilth and aid in erosion, weed, and insect control.

Both systems of management include the use of adapted crop varieties and the common weed- and insect-control practices. Corn may yield 10 to 15 percent more than estimated in System II if increased rates of planting and fertilization are used.]

Map symbol	Soil name and management system	Yield per acre of—					
		Corn	Soybeans	Oats	Red clover and timothy	Alfalfa	Pasture
		Bu.	*Bu.*	*Bu.*	*Tons*	*Tons*	*Days* [1]
B	Blockton silt loam, 0–1% slopes:						
	I	35	20	25	[2]	[2]	80
	II	45	22	35	1. 3	2. 1	130
CA	Clearfield silty clay loam 2–6% slopes:						
	I	40	20	21	[2]	[2]	80
	II	50	22	33	1. 1	1. 7	130
CB	Clearfield silty clay loam, 2–6% slopes, eroded:						
	I	30	17	19	[2]	[2]	80
	II	40	19	30	1. 0	1. 6	120
GA	Gara silt loam, 7–11% slopes:						
	I	23	14	16	[2]	[2]	70
	II	35	[2]	28	1. 1	1. 9	110
GB	Gara silt loam, 7–11% slopes, eroded:						
	I	20	12	13	[2]	[2]	60
	II	30	[2]	25	. 9	1. 6	90

Gc	Gara silt loam, 12–16% slopes:						
	I	20	[2]	14	[2]	[2]	70
	II	30	[2]	25	1. 0	1. 7	100
Gd	Gara silt loam, 12–16% slopes, eroded:						
	I	[2]	[2]	10	[2]	[2]	60
	II	[2]	[2]	20	. 8	1. 5	90
Ge	Gara silt loam, 17–30% slopes:						
	I	[2]	[2]	[2]	[2]	[2]	90
	II	[2]	[2]	[2]	[2]	[2]	100
Gf	Gara silt loam, 17–30% slopes, eroded:						
	I	[2]	[2]	[2]	[2]	[2]	50
	II	[2]	[2]	[2]	[2]	[2]	80
GY	Gravity silty clay loam, 2–6% slopes:						
	I	50	27	40	[2]	[2]	90
	II	70	28	50	2. 2	3. 2	150
H	Humeston silt loam, 0–1% slopes:						
	I	30	20	23	[2]	[2]	80
	II	40	24	34	1. 8	2. 4	130
La	Ladoga silt loam, 2–6% slopes:						
	I	35	18	18	[2]	[2]	80
	II	50	20	34	1. 5	2. 4	120
Lb	Ladoga silt loam, 2–6% slopes, eroded:						
	I	30	17	17	[2]	[2]	70
	II	45	18	30	1. 3	2. 2	110
Lc	Ladoga silt loam, 7–11% slopes:						
	I	30	16	16	[2]	[2]	70
	II	45	[2]	29	1. 1	2. 1	110
Ld	Ladoga silt loam, 7–11% slopes, eroded:						
	I	25	15	15	[2]	[2]	70
	II	45	[2]	27	1. 0	1. 9	100
Ma	Lagonda-Clarinda complex, 7–11% slopes:						
	I	25	14	16	[2]	[2]	70
	II	35	[2]	27	1. 2	1. 4	110
Mb	Lagonda-Clarinda complex, 7–11% slopes, eroded:						
	I	20	10	13	[2]	[2]	60
	II	[2]	[2]	20	. 8	1. 1	90
Mc	Lagonda-Clarinda complex, 12–16% slopes:						
	I	15	6	10	[2]	[2]	50
	II	[2]	[2]	14	1. 0	1. 1	70

See footnotes at end of table.

TABLE 3.—*Estimated yield of crops to be expected over a 5- to 10-year period from Taylor County, Iowa, soils under two management systems*—Continued

Map symbol	Soil name and management system	Yield per acre of—					
		Corn	Soybeans	Oats	Red clover and timothy	Alfalfa	Pasture
		Bu.	*Bu.*	*Bu.*	*Tons*	*Tons*	*Days* [1]
MD	Lagonda-Clarinda soil complex, 12–16% slopes, eroded:						
	I	10	([2])	8	([2])	([2])	40
	II	([2])	([2])	12	.5	.9	60
N	Nodaway silt loam, 0–2% slopes:						
	I	[3] 55	[3] 26	[3] 40	([2])	([2])	90
	II	[3] 65	[3] 28	[3] 50	[3] 2.2	[3] 3.2	150
OW	Olmitz-Wabash complex, 2–6% slopes:						
	I	[3] 55	[3] 28	[3] 40	([2])	([2])	90
	II	[3] 65	[3] 29	[3] 50	2.2	3.2	150
RA	Sharpsburg silty clay loam, 0–2% slopes:						
	I	50	24	24	([2])	([2])	90
	II	70	28	47	2.2	3.2	150
RB	Sharpsburg silty clay loam, 2–6% slopes:						
	I	45	21	21	([2])	([2])	90
	II	65	23	43	1.8	2.8	150
RC	Sharpsburg silty clay loam, 2–6% slopes, bench position:						
	I	45	21	21	([2])	([2])	90
	II	65	23	43	1.8	2.8	150
RD	Sharpsburg silty clay loam, 2–6% slopes, eroded:						
	I	40	20	19	([2])	([2])	90
	II	55	22	36	1.7	2.6	140

RE	Sharpsburg silty clay loam, 7–11% slopes, eroded:						
	I	30	19	14	([2])	([2])	80
	II	50	20	33	1. 7	2. 4	130
SA	Shelby silt loam, 7–11% slopes:						
	I	30	17	18	([2])	([2])	70
	II	45	([2])	31	1. 4	2. 1	110
SB	Shelby silt loam, 7–11% slopes, eroded:						
	I	20	14	14	([2])	([2])	60
	II	35	([2])	25	1. 2	1. 9	90
SC	Shelby silt loam, 12–16% slopes:						
	I	20	([2])	10	([2])	([2])	70
	II	30	([2])	25	1. 0	1. 7	100
SD	Shelby silt loam, 12–16% slopes, eroded:						
	I	([2])	([2])	10	([2])	([2])	60
	II	([2])	([2])	20	. 8	1. 5	90
SE	Shelby silt loam, 17–30% slopes, eroded:						
	I	([2])	([2])	([2])	([2])	([2])	50
	II	([2])	([2])	([2])	([2])	([2])	80
WA	Wabash silty clay loam, 0–1% slopes:						
	I	[3] 40	[3] 21	[3] 30	([2])	([2])	80
	II	[3] 60	[3] 24	[3] 35	[3] 1. 8	[3] 2. 0	130
WB	Wabash silty clay, 0–1% slopes:						
	I	[3] 35	[3] 20	[3] 17	([2])	([2])	80
	II	[3] 50	[3] 22	[3] 20	[3] 2. 0	[3] 1. 1	130
WM	Winterset silty clay loam, 0–1% slopes:						
	I	45	27	40	([2])	([2])	90
	II	70	28	46	2. 2	3. 2	150
WN	Winterset silty clay loam, 0–1% slopes, bench position:						
	I	45	27	40	([2])	([2])	90
	II	70	28	46	2. 2	3. 2	150

[1] Number of days 1 acre will provide sufficient grazing for 1 cow. For example, an acre of pasture that will carry 2 cows for 60 days has a rating of 120 pasture days.

[2] Soil rarely used for this crop under the system of management specified.

[3] Protected from overflow.

You may want to consider a system of soil management different from either of those used in making up the estimates in table 3. The map can be used to help decide whether or not a new practice will work on your farm. If the practice has worked out well for someone else on the same soils that you have, it will probably work well for you. The county extension director may know where new soil management practices have been tried on the same kinds of soils as are on your farm.

KNOW WHAT GOOD SOIL MANAGEMENT MEANS

Practices are similar for many soils.—Some of the practices that are basic to good farming on most of the soils are outlined here. Which practice or practices are needed on any one farm will depend in part on its soils. Likewise, the practice given first emphasis by the farmer will depend to a large extent on the present use and management of the different soils. The suggested practices given on pages 20 to 25 and in table 2 are essentially minimum for soil improvement and conservation, and many farmers may choose to farm their land even less intensively. For example, instead of adopting the suggested maximum corn rotations, a rotation may be selected that includes less corn.

Select a good rotation to fit the soil.—A good rotation for cultivated soils should include a legume crop, as alfalfa, sweetclover, or red clover. Often a mixture of legumes will be more satisfactory than a single legume. The selection of the legume will depend on the acidity of the soil and whether lime can be applied before seeding, since alfalfa and sweetclover do poorly on acid soils.

One purpose of these legumes in the rotation is to supply nitrogen and organic matter to the soil. The legumes have root nodules that are the home of a special kind of bacteria. These bacteria change nitrogen from the air into organic-matter nitrogen. About one-third of this organic-matter nitrogen is found in the roots, and the rest moves into the leaves and stems. As much as possible of the above-ground part of

TABLE 4.—*Influence of rotation on corn yield on sloping Marshall soil, at Clarinda Experiment Farm, Page County, Iowa*

Experiment number[1]	Crop rotation	Corn yield
		Bushels per acre
1 and 2	Continuous corn	[2] 18
	Corn, oats, meadow	[2] 84
6	Corn, oats	[3] 62
	Corn, oats, meadow	[3] 104

[1] Experiments 1 and 2 are runoff plots, for soil and water loss studies, and are steeper and more eroded than the site for Experiment 6.
[2] Average yield for 1947–51, from experiment started in 1931.
[3] Average yield for 1948–52.

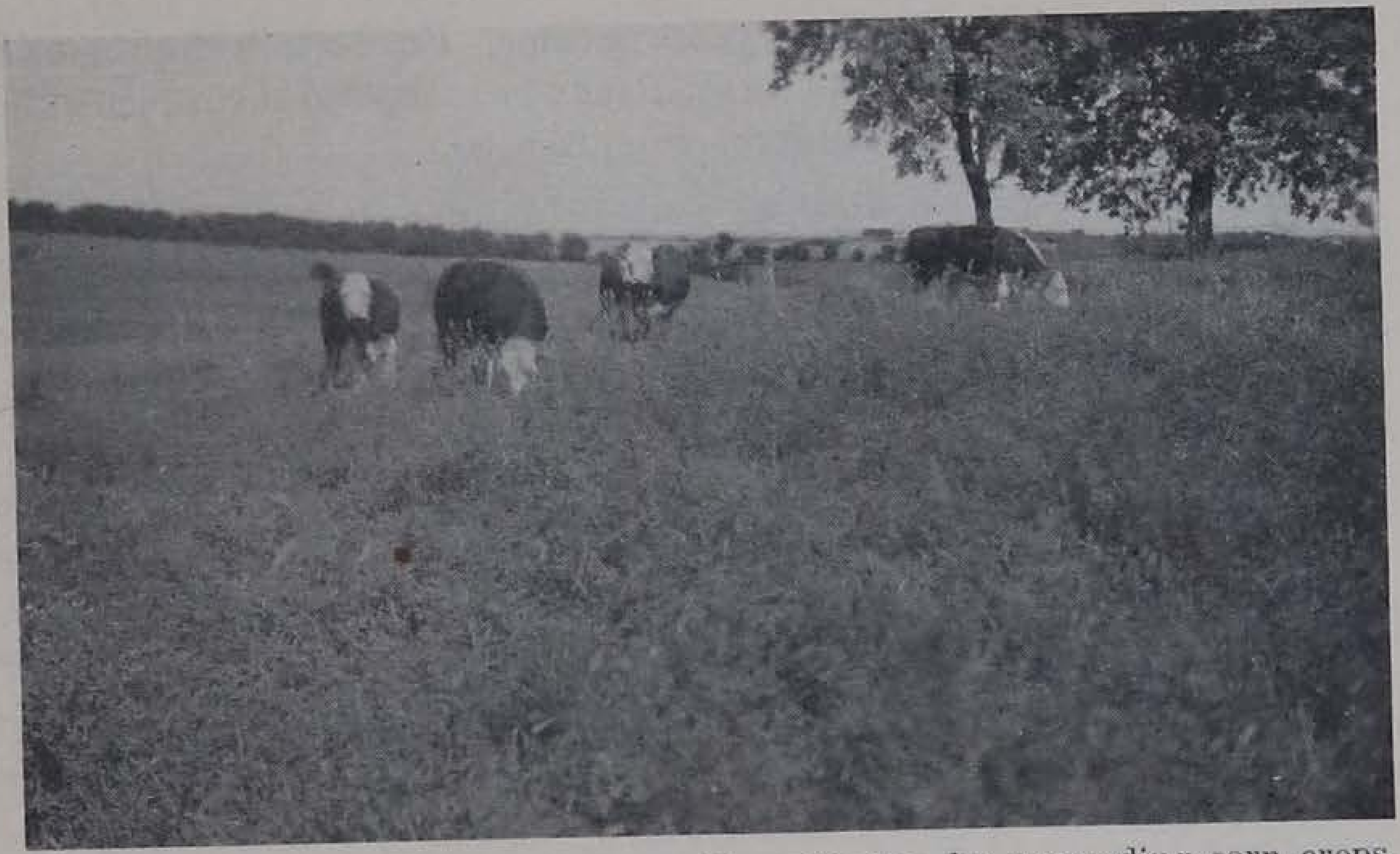


FIGURE 4.—Good rotation pasture provides nitrogen for succeeding corn crops, helps control erosion, and, most important, furnishes high quality feed for livestock.

the legume therefore should be returned to the soil, either as green manure or plant residues. Since the corn crop is a heavy user of nitrogen, it is best to plant corn after a legume sod crop.

Another purpose of the legumes is to improve and maintain good soil tilth. Good thick legume sods help to keep the surface soil granular and porous and protect it from the beating action of heavy rains. Mixed legume and grass sods, especially alfalfa-bromegrass mixtures, are superior to straight legumes for good soil tilth.

How corn yields are related to the crop rotation is shown in table 4. The experiments were made on Marshall soil on about 9-percent slopes at the Soil and Water Conservation Experimental Station in Page County.[1] The Marshall soils are similar to the Sharpsburg soils, although the Marshall subsoil is somewhat more porous and allows water to pass through it more rapidly.

The data given in table 4 show that a rotation including a legume meadow results in highest corn yields (fig. 4). In this experiment the meadow crop was a mixture of legumes including red clover.

Suggested rotations are given for each soil in the county in table 2, and on pages 27 to 53. In developing these rotations as guides to good soil management many things were considered, but greatest importance was attached to suggesting practical rotations which would

[1] Research results of the experimental station are published in bulletins, copies of which may be obtained from the county extension agent or from Iowa State College, Ames.

help give high yields for many years to come. For certain sloping soils the percentage of corn in the rotation may be increased if supplemental practices as contouring and terracing are used.

Control erosion on sloping soils.—Many soils have slopes that erode easily when planted to corn (fig. 5). Loss of surface soil, on soils such as the Shelby and Gara, severely reduces future productivity, partly because a good seedbed cannot be prepared in the exposed subsoil. Deep gullies may also form if excessive runoff occurs.

Erosion of the surface soil can be controlled in several ways. The suggested rotations and uses of the various sloping soils given in table 2 and on pages 27 to 53 will aid in its control. Additional protection against surface soil erosion and gully erosion can be had by contouring the corn crop. Increased yields of corn may also be expected, especially on Sharpsburg soils. In general, effectiveness of contouring decreases with increasing slopes; if slopes are greater than 15 to 18 percent, contouring is not very effective.

Fields that can be cropped to corn on the contour usually have draws in which runoff water concentrates. Such draws frequently are found in the areas of Olmitz-Wabash soils. In many draws, gullies are already present and are often so deep they cannot be crossed by machinery. Figure 6 shows such gullies. Sod waterways should be established in areas where runoff water concentrates. They are beneficial whether contouring is practiced or not. They are a necessary supplement to contouring because the contoured rows cannot hold all the

FIGURE 5.—Gully actively forming in a field of corn. Natural drainageways such as this should be kept in sod to prevent gullying.

FIGURE 6.—Gullies actively eroding Olmitz-Wabash soil areas. Gullies have cut the field into several parts, making proper management difficult.

water from very heavy rains, and contouring tends to concentrate runoff waters into a few places.[2]

By using terraces, long slopes can be shortened. Terraces are especially effective if combined with contouring and good rotations. They need to be constructed with careful engineering skill because poorly designed or wrongly placed terraces may break and cause serious damage to the land. The county extension agent or soil conservation district commissioners will give advice on obtaining aid in laying out terraces on individual farms. It must be stressed that improperly constructed terrace systems may actually increase damage by erosion.

Drain wet land.—If corn, oats, and alfalfa are to make their best growth, they must be able to root deeply. In soils that are wet, plants have shallow roots, nutrients are not readily available, and late in the season the crop may actually suffer from drought. Some fields or parts of fields in the county may benefit from additional drainage.[3] Figure 7 illustrates why the Clearfield soils are naturally wet. Some areas of Winterset soils may also require additional drainage. Wabash silty clay loam areas are also often wet because they drain very slowly after rains or flooding.

Add lime to acid soils.—Lime is often required for such legumes as red clover and alfalfa. Each field should be tested[4] and the proper

[2] Further information on contouring and grassed waterways may be obtained from the county extension agent or from Iowa State College, Ames.

[3] Drainage information may be obtained from the Department of Agricultural Engineering, Iowa State College, Ames.

[4] Information on soil tests may be obtained from the county extension agent and from Iowa State College, Ames.

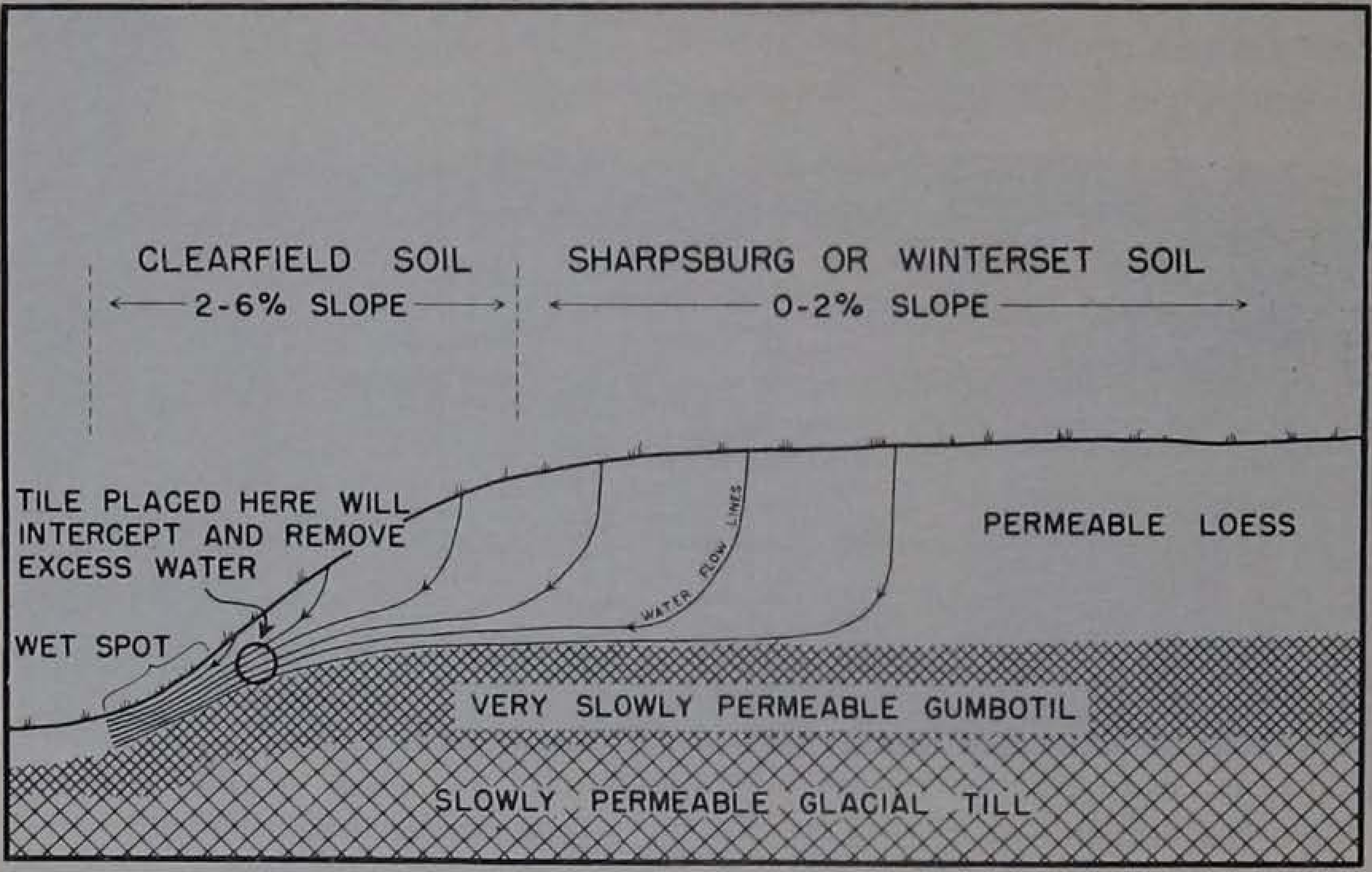


FIGURE 7.—Diagram showing how "wet" or "seepy" spots are formed on Clearfield soils. The subsoil water does not drain into the weathered tight clay glacial till. Instead it flows down the slope and saturates the area where the loess is thin.

quantities of limestone applied where needed. Limestone is applied chiefly to get a good growth of inoculated legume crops, such as alfalfa, red clover, or sweetclover. These legume crops supply nitrogen and organic matter.

Return manure and crop residues to the soil.—Nitrogen is the plant nutrient most quickly depleted by grain crops such as corn and oats. Lack of nitrogen also limits growth of bromegrass, timothy, and bluegrass. Fortunately, a shortage of nitrogen can be corrected by applying manure or by including legume sods in the rotations. Nitrogen may also be supplied through commercial fertilizer.[5]

Besides nitrogen, manure also contains a fair quantity of phosphate and potash. Careful handling of manure, such as preventing loss of the liquid manure or preventing rainfall from washing out valuable elements, is necessary if the greatest benefits are to be gained.

Crop residues, as oat straw, soybean stems, or cornstalks return nitrogen to the soil and add organic matter. Organic matter promotes good soil tilth; it helps to keep the surface soil porous and loose.

Keep different plant nutrients in balance.—Nitrogen, phosphate, and potash are important plant nutrients that are most likely to become limiting in Taylor County soils. As pointed out previously,

[5] Information on fertilizer grades, rates, and methods of application can be obtained from the county extension agent or from Iowa State College, Ames.

nitrogen can be supplied through legumes in the rotation, by the return of manure and crop residues, or by commercial fertilizer. If available phosphorus and potash are low, yields of corn may be disappointing even though an adequate supply of nitrogen is present. If available phosphorus is low, poor legume stands will be obtained and little nitrogen added to the soil. Such soils as the Shelby and Gara especially need commercial phosphorus fertilizer if good legume meadows are desired.

For best crop yields, nitrogen, phosphorus, and potash must be maintained in suitable balance and in adequate quantities. Because the soils of the county vary so greatly in fertility, no general statement can be made as to the fertilizing material to use, how much to use, and how and when to apply it. What is best will depend on the soil type, what the soil tests show, and the rotations used.

Know the specific problems of each soil.—Summarized information about all the soil units is given in tables 1 and 7. More detailed description and discussion of the different soil units will be found on pages 26 to 53. Information on suggested rotations, soil treatment, and erosion control practices will also be found on these pages and in table 2.

By using the soil map to identify the soil conditions and by studying the information just referred to, you can determine weaknesses in the present management and start a program of improvement. Obviously it will be necessary to base the plan on the way the land has been cropped and managed in the past and on future desires as well as on the soils.

Some of the management suggestions for the various soils may be unfamiliar to some farmers. For example, lack of practice or experience in laying out contour lines or in collecting soil samples for lime or fertilizer tests may deter some farmers from following the suggestions. In such cases it may be advantageous to consult the county extension agent about a demonstration of some new management practices. The county soil conservation district has made arrangements with the United States Department of Agriculture for the services of a technician to aid individual farmers in planning sound soil management programs. Such practices as filling in gullies or laying out terraces will probably require some technical assistance to insure best results.

Some points to remember in the use of your soils.—On many farms it will be rather easy to develop sound soil management and soil-conserving programs. Farms that have considerable areas of Winterset and Sharpsburg soils probably can continue to grow about the same acreage of intertilled crops such as corn. On farms that have mostly Shelby and Gara soils, many farmers will need to select proper crop rotations and suitable erosion control practices that will help to avoid serious erosion of the land. On many of these farms a sound soil management program may be achieved only after considerable study of the whole farm organization.

SOILS OF TAYLOR COUNTY, THEIR USE AND MANAGEMENT

The soils of Taylor County are described in the following pages, and their use and management are discussed. Their location and distribution are shown on the accompanying soil map, and their acreage and proportionate extent are given in table 5.

TABLE 5.—*Acreage and proportionate extent of the soils mapped in Taylor County, Iowa*

Map symbol	Soil	Acres	Percent
B	Blockton silt loam, 0–1% slopes	713	0. 2
CA	Clearfield silty clay loam, 2–6% slopes	9, 075	2. 6
CB	Clearfield silty clay loam, 2–6% slopes, eroded	927	. 3
GA	Gara silt loam, 7–11% slopes	4, 124	1. 2
GB	Gara silt loam, 7–11% slopes, eroded	8, 044	2. 4
GC	Gara silt loam, 12–16% slopes	3, 634	1. 1
GD	Gara silt loam, 12–16% slopes, eroded	4, 566	1. 3
GE	Gara silt loam, 17–30% slopes	814	. 2
GF	Gara silt loam, 17–30% slopes, eroded	1, 389	. 4
GY	Gravity silty clay loam, 2–6% slopes	8, 364	2. 5
H	Humeston silt loam, 0–1% slopes	905	. 3
LA	Ladoga silt loam, 2–6% slopes	3, 224	1. 0
LB	Ladoga silt loam, 2–6% slopes, eroded	2, 725	. 8
LC	Ladoga silt loam, 7–11% slopes	99	(1)
LD	Ladoga silt loam, 7–11% slopes, eroded	347	. 1
MA	Lagonda-Clarinda complex, 7–11% slopes	21, 382	6. 3
MB	Lagonda-Clarinda complex, 7–11% slopes, eroded	19, 699	5. 8
MC	Lagonda-Clarinda complex, 12–16% slopes	34	(1)
MD	Lagonda-Clarinda complex, 12–16% slopes, eroded	334	. 1
N	Nodaway silt loam, 0–2% slopes	19, 136	5. 6
OW	Olmitz-Wabash complex, 2–6% slopes	48, 523	14. 4
RA	Sharpsburg silty clay loam, 0–2% slopes	998	. 3
RB	Sharpsburg silty clay loam, 2–6% slopes	55, 916	16. 6
RC	Sharpsburg silty clay loam, 2–6% slopes, bench position.	946	. 3
RD	Sharpsburg silty clay loam, 2–6% slopes, eroded	11, 540	3. 4
RE	Sharpsburg silty clay loam, 7–11% slopes, eroded	1, 403	. 4
SA	Shelby silt loam, 7–11% slopes	23, 918	7. 1
SB	Shelby silt loam, 7–11% slopes, eroded	59, 375	17. 6
SC	Shelby silt loam, 12–16% slopes	3, 719	1. 1
SD	Shelby silt loam, 12–16% slopes, eroded	9, 225	2. 7
SE	Shelby silt loam, 17–30% slopes, eroded	853	. 3
WA	Wabash silty clay loam, 0–1% slopes	4, 049	1. 2
WB	Wabash silty clay, 0–1% slopes	1, 237	. 4
WM	Winterset silty clay loam, 0–1% slopes	6, 509	1. 9
WN	Winterset silty clay loam, 0–1% slopes, bench position	174	. 1
	Total	337, 920	100. 0

[1] Less than 0.1 percent.

BLOCKTON SOIL

Blockton silt loam, 0–1% slopes (B)

Blockton silt loam soil, 0–1% slopes, has developed from fine-textured or clayey riverwash on low level benches along the wider bottom lands. It is associated with the Sharpsburg and Winterset soils on bench positions and with Nodaway and Wabash soils of the bottom lands. The natural vegetation was prairie grasses and scattered trees.

Soil Profile.—The surface soil is a grayish-brown silt loam about 10 inches thick. The subsurface is a layer of mixed light-gray silt and dark-gray silt loam about 5 inches thick. The subsoil, beginning at a depth of approximately 15 inches, is a brownish-gray compact clay that water penetrates slowly.

Use and management.—The heavy compact subsoil hinders drainage. In wet years this will result in lower yields. Water penetrates the subsoil too slowly to permit effective tile drainage. Surface ditches, however, will help remove excess water. Bedding is another method of removing surface water. With this method the lands are plowed each year with the back furrows in the same position. After a few years a series of low ridges are built up that slope into shallow ditches along the dead furrows. Beds can be constructed quickly with special types of machinery.

Undrained areas will provide good pasture. Where natural drainage has been improved, the soil is suited to corn and small grains. Soil tests will probably indicate a need for lime and phosphate. For highest crop yields these elements should be supplied as needed.

The suggested management is as follows:

1. Provide surface drainage by ditches or by bedding.
2. Lime according to soil tests.
3. Adopt a rotation to maintain crop yields at a high level.

   Rotations suggested are:

   Corn, soybeans, oats, meadow.
   Corn, oats, sweetclover catch crop.
   Corn, soybeans, oats, sweetclover catch crop.
4. Use fertilizer according to soil tests and recommendations of the county extension director.

Estimated yields for different field crops on this soil are given in table 3, page 16.

CLEARFIELD SOILS

The Clearfield soils, not extensive in this county and occurring mostly in the northeastern part, are:

Clearfield silty clay loam, 2–6% slopes (CA).
Clearfield silty clay loam, 2–6% slopes, eroded (CB).

These soils occupy sloping areas at the heads of small upland drainageways in association with more steeply sloping Lagonda-Clarinda soils. They also occur with the more gently sloping Sharpsburg and the nearly level Winterset soils.

Clearfield soils have developed from silty wind-laid material called loess. In some places it may be only 40 to 60 inches thick. Underneath the loess is a dense slowly permeable weathered glacial till, which is a mixture of gravel, sand, and clay deposited by glaciers. Where the loess is thin, wet or seepy spots develop. The reason for the wetness and the suggested method of drainage are shown in figure 7.

SOIL PROFILE (UNERODED SOILS).—The surface soil (0 to 10 inches) is dark-gray silty clay loam. The subsurface layer (10 to 18 inches) is dark grayish-brown friable silty clay loam. The subsoil, beginning at 18 inches, is grayish-brown to pale-brown silty clay loam. It is more compact than the surface layers, and water penetration is moderately slow to slow.

The Clearfield soils will produce moderate yields if erosion is controlled and their natural wet condition is relieved. See table 3, page 16, for estimated yields of different crops on the Clearfield soils.

Clearfield silty clay loam, 2–6% slopes (CA)

The profile of Clearfield silty clay loam, 2–6% slopes, is like the one just described for Clearfield soils. There are 10 to 14 inches of surface soil.

Use and management.—Clearfield silty clay loam, 2–6% slopes, is wet in many years. Properly placed drain tile will intercept and remove much of the excess subsoil water. Because this soil occurs on slopes of 2 to 6 percent, erosion is also a problem. Where the rows have about a 2-percent slope into a terrace channel or grass waterway, use of graded contour cultivation will decrease erosion and remove excess water. If possible, meadow crops should also be used to control erosion. To get best yields from meadow crops, lime must be added to correct the acidity of the soil. Soil tests will help in determining how much lime, phosphate, and potash should be supplied to obtain best yields of the different crops.

The suggested management is as follows:

1. Drain, if necessary, by interceptor tile.
2. Lime according to soil test.
3. Start erosion control practices and suitable rotations as follows:
   Without terraces or contour cultivation, use a rotation of corn, oats, meadow, meadow.
   With graded terraces and graded contours, use corn, corn, oats, meadow.
4. Use fertilizer according to soil tests and recommendations of the county extension director.

For the corn in the rotations just suggested, complete commercial fertilizer applied in the hill or row will often increase yields. Nitrogen fertilizer applied to oats will often increase yields.

Clearfield silty clay loam, 2–6% slopes, eroded (CB)

About 3 to 9 inches of surface soil now remains on Clearfield silty clay loam, 2–6% slopes, eroded. The rest of the surface soil has been eroded away, probably because of too much cropping to corn. Except for erosion of the surface soil, the profile of this soil is like the one previously described for uneroded Clearfield soils.

Use and management.—The suggestions for use and management of Clearfield silty clay loam, 2–6% slopes, also apply to this soil.

GARA SOILS

The Gara soils, occurring in all parts of the county except the northeastern, include:

- Gara silt loam, 7–11% slopes (GA).
- Gara silt loam, 7–11% slopes, eroded (GB).
- Gara silt loam, 12–16% slopes (GC).
- Gara silt loam, 12–16% slopes, eroded (GD).
- Gara silt loam, 17–30% slopes (GE).
- Gara silt loam, 17–30% slopes, eroded (GF).

Gara soils are generally on steep slopes next to the larger stream bottoms. They usually are between the Ladoga soils, which are on the ridge tops, and the Gravity or Olmitz-Wabash soils, which occur in the drainageways.

Gara soils have developed from glacial till, which is a mixture of gravel, sand, and clay. The native vegetation was a mixture of grasses and trees. These soils are not so high in organic matter as those formed under grass alone, nor are they so low in organic matter as those developed under trees alone. They are dark when wet and light-colored when dry.

968972—54——3

SOIL PROFILE (UNERODED SOILS).—The surface layer, about 7 inches thick, is brownish-gray friable loam or silty loam. The subsurface layer consists of about 3 inches of yellowish-brown friable clay loam. The subsoil to a depth of 30 inches is dense yellowish-brown clay loam or sandy clay. Below 30 inches the soil becomes somewhat lighter colored. Gravel pebbles are scattered through the subsoil. Occasionally small pieces of lime occur at a depth of about 4 feet.

Because Gara soils occur on slopes, erosion is a problem if corn is grown. Only the more gently sloping Gara soils should be used occasionally for a corn crop. Even then, erosion controlling practices such as contouring and terracing should be used. Because of the erosion hazard, Gara soils are best suited to pasture or timber. Maximum returns from pasture [6] can be obtained by using good management. This includes frequent renovations, introduction of legumes to provide essential nitrogen, and soil tests to determine need for and application of lime, phosphate, and potash. Estimated yields for different crops on Gara soils are given in table 3, page 16.

A special symbol, S, shown on the soil map, indicates areas of about 5 acres or less that have lost all of their surface soil by erosion. Severely eroded areas of Gara soil are low in productivity, and field crops would do very poorly on them. These areas should be kept in permanent vegetation to prevent serious gully erosion. Applications of lime, organic matter, and fertilizer may be necessary for the successful establishment of grass.

Timber is adapted to the steeply sloping Gara soils. Many areas of these soils now are in timber. Oak, elm, and hickory are the trees most numerous. Most of the timbered areas in the county have been cut over at least once. After the original cutting, most timber stands were neglected. As a result they are not yielding so well as they should. To obtain maximum returns, timber should be managed to obtain greatest possible growth. Such management includes fencing out livestock to allow growth of young seedlings, occasional thinning of young trees to eliminate overcrowding, selecting trees for cutting as they reach marketable size, and elimination of old or dead trees.[7]

Gara silt loam, 7–11% slopes (GA)

Gara silt loam, 7–11% slopes, has about 8 to 10 inches of surface soil. Its profile is like the one heretofore described as representative of

[6] Further information concerning pastures is contained in bulletins that can be obtained upon request from the county extension director or Iowa State College, Ames.

[7] For information on timber management write the Forestry Department, Iowa State College, Ames.

Gara soils. The depth of surface soil shows that little or no erosion has taken place.

Use and management.—Because Gara silt loam, 7–11% slopes, erodes readily, it is best suited to permanent vegetation. Most of it is used for pasture or timber. Corn, however, can be grown if erosion is controlled.

Corn yields obtained will depend on control of erosion and addition of needed organic matter and plant nutrients. Organic matter can best be added through use of legume-grass meadows. For best growth of meadow, lime should be added according to soil tests. Phosphate should also be applied at the time of the legume-grass seeding.

The suggested management is as follows:

1. Lime according to soil test.
2. Erosion control practices and suitable rotations:
   Without terraces or contour cultivation, use corn, oats, and 3 years of meadow, or oats followed by 4 years of meadow.
   With contour cultivation, use corn, oats, meadow, meadow.
   With terraces and contour cultivation, use corn, corn, oats, meadow, meadow.
3. Use fertilizer according to soil tests and recommendations of the county extension director. Phosphate fertilizer is usually needed for legumes.

For the corn in the rotations just suggested, a complete commercial fertilizer will often increase the yield.

Gara silt loam, 7–11% slopes, eroded (GB)

Erosion has removed much of the surface soil from Gara silt loam, 7–11% slopes, eroded. About 2 to 8 inches of the surface soil now remains. In some places the subsoil is therefore present in the plow layer. Except for the loss of surface soil through erosion, this soil has a profile like that previously described for uneroded Gara soils.

Use and management.—Prevention of further erosion is one important problem. If this soil is used for pasture or timber, erosion can be controlled. Corn can be grown occasionally, but it should be planted and cultivated only on the contour.

Another important problem is increasing the fertility of the soil. Organic matter and nitrogen can be added by using legume-grass meadow in the rotation. Barnyard manure will add organic matter and some nitrogen, phosphorus, and potassium. This soil is acid, and lime should be applied before seeding meadows. Phosphate should also be applied at the time of the legume-grass seeding.

The suggested management is as follows:

1. Lime according to soil test.
2. Erosion control practices and suitable rotations:
   - Without terraces or contour cultivation, use permanent meadow renewed with a nurse crop of oats.
   - With contour cultivation, use corn and oats, followed by 3 years of meadow.
   - With contour cultivation and terraces, use corn, oats, meadow, meadow.
3. Use fertilizer according to soil tests and recommendations of the county extension director. Phosphate fertilizer is usually needed for legumes.

For the rotations suggested, a complete commercial fertilizer applied in the row will often increase yields of corn.

Gara silt loam, 12–16% slopes (Gc)

Gara silt loam, 12–16% slopes, has a profile similar to that previously described for Gara soils. Most of the surface soil, about 8 to 10 inches, is present. This indicates that pasture or timber has been on this land most of the time.

Use and management.—Because of its steep slopes, this soil is not well suited to corn. Terracing is not recommended for soils with such slopes. Under cultivation, runoff is rapid and causes serious erosion. This soil therefore is best suited to pasture or timber. Suggestions given on page 30 for pasture and timber management apply to this and other Gara soils.

Corn can be grown safely in a long rotation, provided it is contoured and no rotation more intensive than corn, oats, meadow, meadow, meadow is used. For meadow seedings, it is likely that soil tests will show a need for phosphorus fertilizer and lime.

The suggested management is as follows:

1. Lime according to soil test.
2. Erosion control practices and suitable rotations if the land is to be cultivated:
   - Without contour cultivation, use permanent meadow renewed with a nurse crop of oats.
   - With contour cultivation, use a rotation of corn, oats, and 3 years of meadow.
3. Use fertilizer according to soil tests and recommendations of the county extension director. Phosphate fertilizer is usually needed for legumes.

For the rotations suggested, a complete fertilizer applied in the row will often increase the yield of corn.

Gara silt loam, 12–16% slopes, eroded (GD)

Gara silt loam, 12–16% slopes, eroded, has a profile similar to that previously described for Gara soils, except that it has only 2 to 8 inches of surface soil remaining. Past management has not controlled erosion, and some of the surface soil has been lost.

Use and management.—This eroded soil is not adapted to cultivation. Slopes are too steep for terraces. Erosion has already removed much of the surface soil and organic matter, and pasture or timber is therefore best suited to this soil. The principles stated on page 30 for pasture and timber management of Gara soils apply to this soil.

Gara silt loam, 17–30% slopes (GE)

Gara silt loam, 17–30% slopes, has a profile similar to the one described for Gara soils. Most of its 7- to 9-inch surface soil remains.

Use and management.—This soil should be in permanent pasture or timber because of its steep slopes. On such steep slopes, even an occasional corn crop causes severe erosion. If the surface soil is removed, a good stand of grass is difficult to obtain; therefore, any pasture renovation should be accomplished without an intervening corn crop. Pasture can be renovated by plowing and seeding back to pasture, with oats as a nurse crop. The oats can then be grazed off. The discussion of pasture and timber management for Gara soils on page 30 applies to this soil.

Gara silt loam, 17–30% slopes, eroded (GF)

The profile of Gara silt loam, 17–30% slopes, eroded, is similar to the one described for Gara soils, except that past cultivation has resulted in erosion of the surface soil. At present 2 to 7 inches of the surface soil remains.

Use and management.—Gara silt loam, 17–30% slopes, eroded, is suited only to pasture and timber. For a more detailed discussion of pasture and timber management on this soil see the general discussion of Gara soils on page 30.

GRAVITY SOIL

Gravity silty clay loam, 2–6% slopes (GY)

Gravity silty clay loam, 2–6% slopes, has developed from material washed from the upland soils. It is found at the base of upland slopes and at the mouths of drainageways associated with the various soils of the bench and bottom lands. Grass was the original vegetation on the Gravity soil. The size of the Gravity soil areas varies from a few acres to 40 or more.

Soil Profile (uneroded soil).—The surface soil of Gravity silty clay loam, 2–6% slopes, consists of about 8 inches of dark-brown friable silty clay loam. The subsurface layer, from 8 to 16 inches, is grayish-brown silty clay loam. The subsoil extends to 30 inches or more and is brown fairly compact silty clay loam. Beneath the subsoil the material ranges from friable silt loam to silty clay loam.

Use and management.—Gravity silty clay loam, 2–6% slopes, occurs on gentle slopes averaging about 3 percent in gradient. Hence, the erosion problem is slight. The soil is sometimes wet because it occurs at the foot of slopes. Surface and internal drainage, however, are usually fast enough to remove excess water. The soil is deep and fertile. It receives occasional deposits of wash from nearby hills during heavy rains. Areas of the soil are sometimes too small to be managed separately. Large areas are intensively cropped.

Because neither drainage nor erosion are serious problems, the principal management problem is the maintenance of fertility. Suitable rotations are corn, corn, oats, meadow; corn, oats, sweetclover catch crop; corn, soybeans, oats, sweetclover catch crop. For best results from a legume-and-grass meadow, some lime may be needed. Lime and fertilizer should be used according to soil tests and recommendations of the county extension director. Table 3, page 17, gives estimated yields for different crops grown on Gravity soil.

HUMESTON SOIL

Humeston silt loam, 0–1% slopes (H)

Humeston silt loam, 0–1% slopes, occurs on low poorly drained flats in the large bottom lands and is associated with Nodaway silt loam. The original vegetation was grass and trees.

Soil Profile.—The surface soil, from 0 to 15 inches, is brownish-gray silt loam. From 15 to about 21 inches, the subsurface layer is light-gray ashy silt loam. The subsoil, beginning at about 21 inches, is dark-gray heavy clay. It is tight, and water passes through it slowly to very slowly. The Humeston silt loam profile is shown in figure 2.

Use and management.—Humeston silt loam, 0–1% slopes, is best adapted to permanent pasture because it presents a serious drainage problem. The surface is level, and water drains off slowly. Internal drainage is also poor because of the dense subsoil. Tile drains will not function satisfactorily, but surface ditches or bedding will help remove excess water.[8] After heavy rains this soil is subject to overflow.

This soil will produce moderate yields of corn, soybeans, oats, and wheat, if drainage is improved and overflow is eliminated. Estimated yields of different crops grown on Humeston soil are given in table 3, page 17. Because lime may be needed to obtain good legume stands, the soil should be tested.

The management recommendations are as follows:

1. Provide surface drainage by ditches or bedding.
2. Adopt a rotation that will maintain crop yields at a satisfactory level. Suitable rotations are corn, soybeans, oats, meadow; corn, oats, wheat, meadow.
3. Use fertilizer according to results of soil tests and recommendations of the county extension director.

LADOGA SOILS

The Ladoga soils, which do not cover a large acreage, occur as scattered small areas in more steeply sloping parts of the county. They are:

Ladoga silt loam, 2–6% slopes (LA).
Ladoga silt loam, 2–6% slopes, eroded (LB).
Ladoga silt loam, 7–11% slopes (LC).
Ladoga silt loam, 7–11% slopes, eroded (LD).

The Ladoga soils have developed from loess; that is, silty windblown material. They usually occupy rounded ridge tops. Occasionally they are on sloping areas just below ridge tops. Most often they are above the more steeply sloping Gara soils, and less frequently they occur above the sloping Shelby soils. The original vegetation was grass and trees. Ladoga soils are lighter colored than the ridgetop Sharpsburg soils developed under grass alone.

SOIL PROFILE (UNERODED SOILS).—The surface soil, 0 to 7 inches deep, is light grayish-brown silt loam. The brownish-gray silt loam subsurface soil is somewhat heavier than the surface layer. The subsoil, which begins at a depth of about 12 inches, is yellowish-brown plastic silty clay. Beneath the subsoil is light-brown silty clay loam. As depth increases this material becomes more silty and lighter brown.

The Ladoga soils are subject to erosion because they occur on slopes. They also have a heavy subsoil that lets water pass through slowly. Under cultivation, runoff is rapid unless the corn is contoured. To obtain maximum use of corn, terraces should also be used. For suggested uses of these soils see table 2, page 12.

[8] For a discussion of bedding see page 27.

The Ladoga soils are used for general crop production. Their use is generally determined by how the adjoining soils are farmed. Areas of these soils are generally too small to manage apart from the surrounding soils. See table 3, page 17, for estimated yields of crops grown on Ladoga soils.

A special symbol, S, shown on the soil map indicates severely eroded areas of about 5 acres or less that have lost all of the surface soil. Such areas are low in productivity but can be built up by heavy additions of barnyard manure.

Ladoga silt loam, 2–6% slopes (LA)

Ladoga silt loam, 2–6% slopes, has the profile described previously for Ladoga soils. There is about 9 to 12 inches of surface soil.

Use and management.—This soil is suited to general crop production, pasture, or timber. It frequently occurs in small areas surrounded by large acreages of the steeply sloping Gara or Shelby soils. As a result it is often used for pasture or timber. Suggestions made for management of pasture and timber on Gara soils, page 30, also apply to the Ladoga soil.

Corn will give moderately high yields. Erosion must be controlled, however, to keep up corn yields. If contouring and terracing are not used, then meadow crops should be grown often. By contouring the corn, the proportion of meadow crops can be decreased.

Lime should be added according to soil tests to correct acidity. Soil tests will likely indicate a need for phosphate fertilizer on the legume-grass seedings. Nitrogen fertilizer added to the oat seedings usually results in higher yields.

The suggested management and rotations are as follows:

1. Lime according to soil tests.
2. Erosion control practices and suitable rotations:
   - Without terraces or contour cultivation, use corn, corn, oats, meadow, meadow, meadow; or corn, oats, meadow, meadow.
   - With contour cultivation, use corn, corn, oats, meadow, meadow.
   - With terraces and contour cultivation, use corn, corn, oats, meadow.
3. Use fertilizer according to results of soil tests and recommendations of the county extension director.

For the rotations just suggested, complete commercial fertilizer applied in the hill or row often increases yields of corn.

Ladoga silt loam, 2–6% slopes, eroded (LB)

Ladoga silt loam, 2–6% slopes, eroded, has a profile similar to the one described from Ladoga soils, except that erosion has removed part of the surface soil. From 3 to 9 inches of surface soil remains.

Use and management.—The suggestions made for Ladoga silt loam, 2–6% slopes, in general apply to this soil. Erosion of the surface soil, however, presents an additional problem, as its removal has resulted in loss of organic matter, which is needed for good soil structure and to furnish nitrogen. Management therefore should be directed toward restoring organic matter and building up the fertility level. Heavy manure applications or a rotation of corn, oats, and 2 years of meadow, combined with terracing and contouring, are suggested. When good productivity has been restored, the rotations suggested for the uneroded silt loam on 2- to 6-percent slopes should prove satisfactory.

Ladoga silt loam, 7–11% slopes (Lc)

Ladoga silt loam, 7–11% slopes, has a profile like the one previously described for uneroded Ladoga soils. It has about 9 to 11 inches of surface soil.

Use and management.—The soil is suited to general crop production, pasture, or timber. It is usually managed with larger areas of Gara or Shelby soils used for pasture or timber. The suggestions for management of pasture and timber on the Gara soils apply to this soil.

Erosion is a problem if corn is grown too often on this soil. Unless erosion controlling practices are used, long rotations should be followed. The use of meadow crops helps reduce erosion. If the corn is planted and cultivated on the contour, less meadow is needed. When terraces are also used, a rotation of corn, corn, oats, meadow, meadow can be followed.

To get the best corn yields, complete commercial fertilizer should be added in the hill or in the row. Lime should also be spread to correct acidity before seeding the soil to legume-grass meadow. Soil tests should be made to determine need for phosphorus and potash.

Management suggestions and rotations are as follows:

1. Lime according to soil test.
2. If the land is to be cropped, start erosion control practices and suitable rotations as follows:
   - Without terraces or contour cultivation, use a rotation of corn, oats, meadow, meadow, meadow.
   - With contour cultivation, use a rotation of corn, oats, meadow, meadow.
   - With terraces and contour cultivation, use a rotation of corn, corn, oats, meadow, meadow.
3. Use fertilizer according to results of soil tests and recommendations of the county extension director.

Ladoga silt loam, 7–11% slopes, eroded (LD)

Ladoga silt loam, 7–11% slopes, eroded, has a profile like that previously described for Ladoga soils, except that erosion has reduced its surface soil to a depth of 3 to 9 inches.

Use and management.—The suggestions made for management of uneroded Ladoga silt loam on 7- to 11-percent slopes generally apply to Ladoga silt loam, 7–11% slopes, eroded. Erosion, however, has increased the fertility problem. Organic matter has been removed with the surface soil. For favorable soil structure and best yields, the organic matter content should be built up, either by heavy manure applications or by rotations that include a year more of meadow than is recommended for the uneroded unit. When productivity has been built up to a satisfactory level, the management practices and rotations suggested for the uneroded Ladoga silt loam on 7- to 11-percent slopes should prove satisfactory.

LAGONDA-CLARINDA COMPLEX

Lagonda and Clarinda silt loams occur in the uplands. They are so closely intermingled that it is very difficult to separate them on a soil map; therefore, they are mapped together as a complex. The complex includes:

- Lagonda-Clarinda complex, 7–11% slopes (MA).
- Lagonda-Clarinda complex, 7–11% slopes, eroded (MB).
- Lagonda-Clarinda complex, 12–16% slopes (MC).
- Lagonda-Clarinda complex, 12–16% slopes, eroded (MD).

This complex usually occupies the heads of drainageways. It occurs below the gently sloping Sharpsburg soils and the nearly level Winterset. Occasionally it is next to the gently sloping Clearfield soils. Most often it adjoins the more steeply sloping Shelby or Gara soils.

Lagonda soils have formed from heavy glacial till, a mixture of clay with a little sand and gravel, deposited by glaciers. Sometimes loess, a silty wind-blown material, is mixed in the surface layer of these soils to a depth of a foot or more. The Clarinda soils have developed on gumbotil, a dense, gray, sticky clay. The subsoil of both of these soils is very tight. The native vegetation on both was prairie grasses.

SOIL PROFILES (UNERODED SOILS).—The dark grayish-brown friable silt loam surface layer of Lagonda silt loam is about 12 inches thick. The subsurface layer, from 12 to 18 inches, is dark grayish-brown silty clay loam. The subsoil is mixed dark grayish-brown and yellowish-gray gritty silty clay. It is compact, tight, and very slowly permeable to water.

The surface layer of Clarinda silt loam, 0 to 7 inches, is friable silt loam. It appears black when wet and dark brown when dry. The subsurface layer, from 7 to 13 inches, is very dark-gray silty clay loam. Beginning at 13 inches, the subsoil is an olive-gray silty clay or clay, called gumbotil. It is very plastic and sticky when wet and extremely hard when dry. Water moves very slowly through this layer.

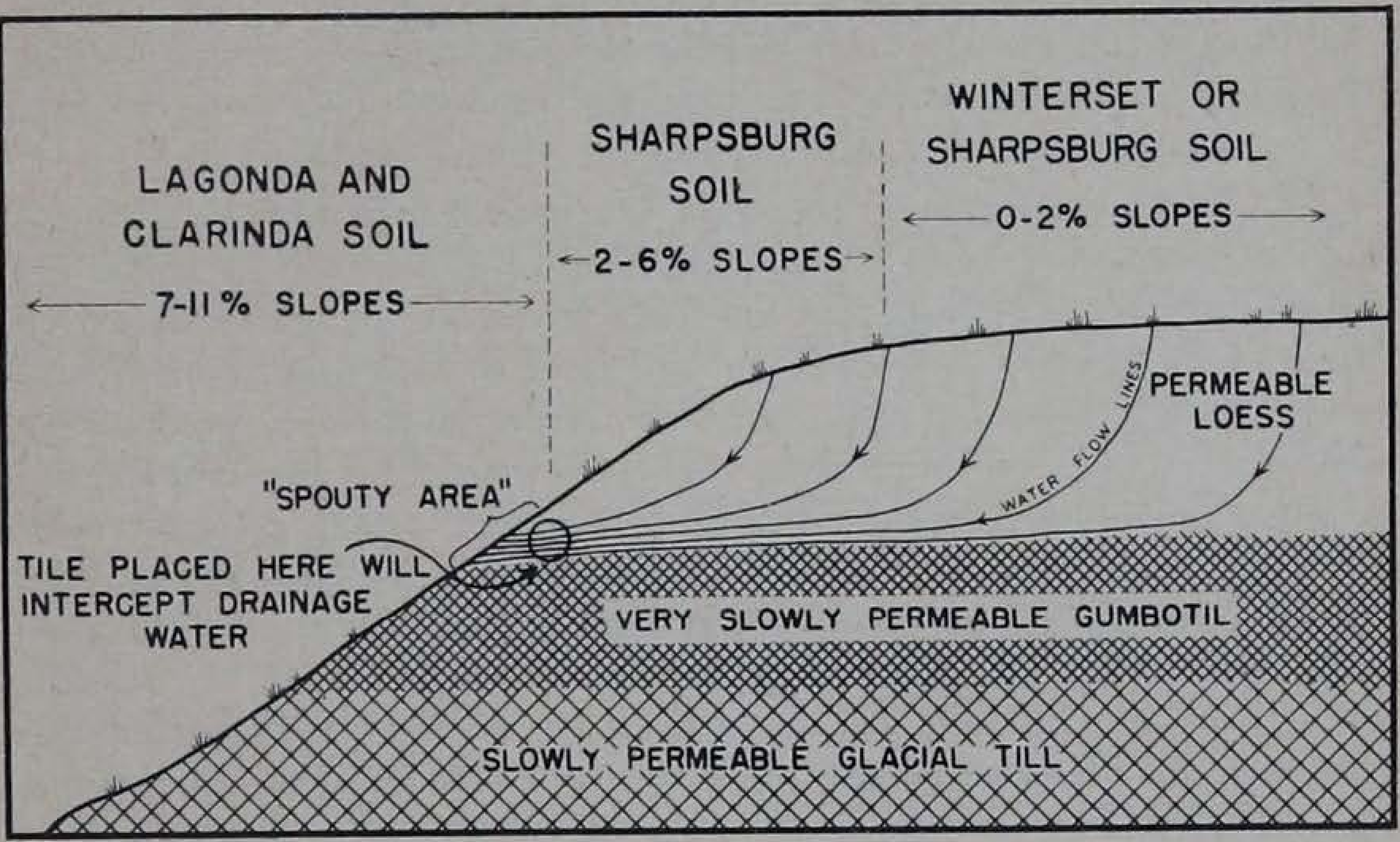


Figure 8.—Diagram showing how "wet," or "spouty," areas are formed on the Lagonda and Clarinda soils. The downward flow of water is stopped by the impervious gumbotil layer. Excess subsoil water then drains down the slope to where the impervious layer outcrops on the slope.

The soils of this complex are best suited to pasture. Any cultivation results in serious erosion because the soils have such tight subsoils. Contouring to control erosion will tend to make the drainage problem worse; therefore, contour lines, if used, should be placed so that the rows have a gentle slope into grassed waterways.

The underdrainage of these two soils is very poor. During any cultivation considerable trouble may be expected. Spouty areas may cause miring of farm machinery. The cause of the wetness and the method of draining these soils is shown in figure 8. At best, seedbed preparation is difficult, and corn yields are poor. For estimated yields of different field crops on Lagonda and Clarinda soils, see table 3, page 17.

A special symbol, S, shown on the map indicates areas of about 5 acres or less that have lost all of their surface soil by erosion. These severely eroded areas of Lagonda-Clarinda complex are low in productivity. It is doubtful that they can again be used profitably for field crops. The areas should be kept in permanent vegetation to prevent serious gully erosion. Applications of lime, organic matter, and fertilizer are necessary for the successful establishment of grass.

Lagonda-Clarinda complex, 7–11% slopes (MA)

The Lagonda and Clarinda soils on 7–11% slopes have profiles similar to those previously described for the Lagonda-Clarinda complex. Little or no erosion has taken place, and each soil therefore has 9 to 12 inches of surface soil.

Use and management.—Lagonda-Clarinda complex, 7–11% slopes, is best suited to pasture. Most grasses and legumes will grow well on these soils, but they are often too wet for alfalfa. Under cultivation they erode rapidly. Contouring will tend to make seepy or spouty spots worse. Contour rows therefore should be given a slight slope. Meadow crops, however, are best for erosion control. Without erosion control practices, corn should be grown only in a long rotation, such as corn, oats, meadow, meadow, meadow. To get best yields from this rotation, add phosphate to the legume-grass seeding. Complete commercial fertilizer applied to the corn in the hill or in the row will often increase corn yields. Lime may also be needed before legumes are seeded. Soil tests will determine how much lime and fertilizer should be supplied.

The management suggestions and rotations are as follows:

1. Lime according to soil test.
2. If the land is to be cultivated, start erosion control practices and suitable rotations as follows:
   - Establish grass waterways in natural drainageways.
   - Without contours or terraces, use corn, oats, meadow, meadow, meadow; or oats, meadow, meadow, meadow.
   - With graded contours or graded terraces laid out so that rows slope gently into terrace channels or grass waterways, use corn, oats, meadow, meadow.
3. Use fertilizer according to soil tests and recommendations of the county extension director.

Lagonda-Clarinda complex, 7–11% slopes, eroded (MB)

The eroded Lagonda and Clarinda soils on 7- to 11-percent slopes have profiles similar to those previously given for the Lagonda-Clarinda complex, but each has only about 3 to 9 inches of surface soil.

Use and management.—These soils are best suited to pasture. Past erosion caused by cropping has already removed considerable surface soil. Further cropping will only result in more erosion of the surface soil and low crop yields. It is doubtful that corn should ever be grown. When pastures become unproductive and require renovation, the land should be fall plowed and the new seeding made with a nurse crop of oats early the following spring.

To get best results from pasture on this complex, apply phosphate to the legume-grass seedings. Some lime will also be needed before the seedings are made. For highest oat yields, nitrogen fertilizer or manure is needed. Soil tests will show how much lime and phosphate are required.

Lagonda-Clarinda complex, 12–16% slopes (Mc)

The Lagonda-Clarinda complex, 12–16% slopes, occupies the more steeply sloping parts of the Lagonda-Clarinda complex. Profile descriptions of the Lagonda and Clarinda soils are given on page 38.

Use and management.—Lagonda-Clarinda complex, 12–16% slopes, is best suited to pasture. It is doubtful that corn should ever be grown on this soil. When pastures become unproductive and require renovation, the land should be fall plowed and the new seeding made with a nurse crop of oats early the following spring. As slopes are steep, cultivation may result in very serious erosion. A good stand of grass might then be difficult to obtain.

For best results in pasture renovation, phosphate should be applied to the legume and grass seedings. Lime may also be needed before the legumes are seeded. Soil tests will serve as a guide for the addition of fertilizer and lime.

Lagonda-Clarinda complex, 12–16% slopes, eroded (Md)

Lagonda-Clarinda complex, 12–16% slopes, eroded, has profile layers like those described on page 38 for the Lagonda-Clarinda complex, except that only 3 to 9 inches of surface soil remain.

Use and management.—The suggestions made for the uneroded unit on 12- to 16-percent slopes also apply to this soil.

NODAWAY SOIL

Nodaway silt loam, 0–2% slopes (N)

Nodaway silt loam, 0–2% slopes, is the most extensive soil of the bottom lands in the county. It is found on low level stream bottoms throughout the county.

FIGURE 9.—Posts cut from native timber on Nodaway soil in foreground; Gara soils in background.

SOIL PROFILE.—The grayish-brown friable silt loam surface soil is about 20 inches thick. The subsurface layer, a grayish-brown friable silt loam mixed with light-gray silt, varies in thickness from a few inches to 2 feet or more. Beneath the subsurface layer is black silty clay loam, which is the old soil of the bottom land that has been covered by recent wash.

Use and management.—Because the Nodaway soil occupies low bottoms, it is usually subject to overflow. Overflow, however, has been reduced in many cases by straightening stream channels and constructing drainage ditches or levees. Areas that overflow frequently are often used for pasture or timber (fig. 9). During normal years these areas provide pasture for most of the grazing season.

Native timber consisting of oaks, hickory, elm, cottonwood, maples, and walnut grows well on this soil. A well-managed stand of these trees will produce a growth of several hundred board feet an acre each year. This growth can be harvested for use on the farm. It may be desirable to augment farm income by selling the timber in the form of posts, cordwood, or lumber. Like any other crop, timber should be managed to yield maximum returns.[9]

Although underdrainage of Nodaway silt loam is usually good, surface drainage often needs improvement. Open ditches will help

[9] Information on management and utilization of farm woodlots can be obtained from Department of Forestry, Iowa State College, Ames.

remove excess surface water. Where surface drainage and overflow are not a problem, this soil is suited to corn and small grains. It has a high fertility level and ordinarily produces high yields. Estimated yields for different crops grown on Nodaway silt loam are given in table 3, page 18. Soil tests should be made to determine whether any lime and commercial fertilizer are needed. It is doubtful, however, that this soil will often show need for lime or fertilizer. A corn-soybean-oats-meadow rotation is well adapted to this soil.

OLMITZ-WABASH COMPLEX

Olmitz-Wabash complex, 2–6% slopes (OW)

Olmitz silt loam and Wabash silty clay loam occur in small upland drainageways. The two soils are so closely associated it is very difficult to separate them on a map of the scale used. They are therefore mapped together as a complex.

Both soils in this complex have formed from wash, or materials eroded from nearby hillsides. This wash material, or alluvium, was mostly deposited before the land was cultivated. The original vegetation was grass and scattered trees.

SOIL PROFILES (UNERODED SOILS).—The dark-brown loam to silt loam surface soil of Olmitz silt loam is about 20 inches thick. Below this depth is the subsoil, which gradually changes from brown to brownish gray. The texture varies from loam to silt loam. Subsoil permeability is moderate to slow.

The surface layer of Wabash silty clay loam is black to very dark-gray friable silty clay loam. Below 24 inches the subsoil is very dark-gray compact silty clay that is slowly permeable to water.

Use and management.—Olmitz-Wabash complex, 2–6% slopes, usually occurs in small narrow areas along drainageways. The areas are often too small to be managed separately from surrounding soils.

Because the Olmitz-Wabash complex occupies drainageways that occasionally carry large volumes of water, it is susceptible to gully erosion. Many areas are now cut by a deep gully. The gullies often work upstream because of small overfalls, and a good grass waterway is often unable to stop gullying. In many places dams may be needed. Where they are no overfalls, properly constructed grass waterways will prevent gullying.[10]

Sometimes areas of the Olmitz-Wabash complex are large enough for separate management. Under cultivation they produce excellent crop yields. A corn-corn-oats-meadow rotation is well adapted.

---

[10] Information on controlling gullies can be obtained from the county extension director or the soil conservation district commissioners.

The fertility level of this complex is high. No plant nutrients other than lime will probably be needed. Soil tests will show how much lime should be added for best crop yields. For yield estimates of different crops on this complex, see table 3, page 18.

SHARPSBURG SOILS

The Sharpsburg soils occur throughout the county in association with all soils of the uplands. They include:

- Sharpsburg silty clay loam, 0–2% slopes (RA).
- Sharpsburg silty clay loam, 2–6% slopes (RB).
- Sharpsburg silty clay loam, 2–6% slopes, bench position (RC).
- Sharpsburg silty clay loam, 2–6% slopes, eroded (RD).
- Sharpsburg silty clay loam, 7–11% slopes, eroded (RE).

In the uplands Sharpsburg soils occur around the borders of the nearly level Winterset soils; next to the ridge-top Ladoga soils; above the Clearfield, Lagonda-Clarinda, and Shelby soils; and sometimes above the Gara soils. In the stream bench position Sharpsburg soil is associated with the Winterset soil that occupies bench positions.

The dark, well-drained, and fertile Sharpsburg soils have developed from silty wind-blown materials called loess. They have the most favorable subsoil for plant growth in the county. The native vegetation was prairie grasses. The area in Iowa and Missouri where Sharpsburg soils are found is shown in figure 10.

SOIL PROFILE (UNERODED SOILS).—The dark grayish-brown friable silt loam or silty clay loam surface layer is about 14 inches thick. The subsoil, from a depth of about 14 to 36 inches, is yellowish-brown silty clay loam or silty clay. It is heavier than the surface soil and is not so permeable to water. Below the subsoil, the soil becomes a lighter yellowish brown. The texture is not so heavy and the material becomes more friable.

The fertility level of the Sharpsburg soils is usually high. Some lime will be needed to correct their acid condition. Phosphate applied to the legume-grass meadow seedings should also be of some benefit. Soil tests will determine the need of these elements.

A special symbol, S, shown on the soil map indicates severely eroded areas of about 5 acres or less that have lost all of their surface soil. Such areas of Sharpsburg soil are low in productivity but may be built up by heavy additions of good barnyard manure. After adding manure and lime, these severely eroded areas may be restored to

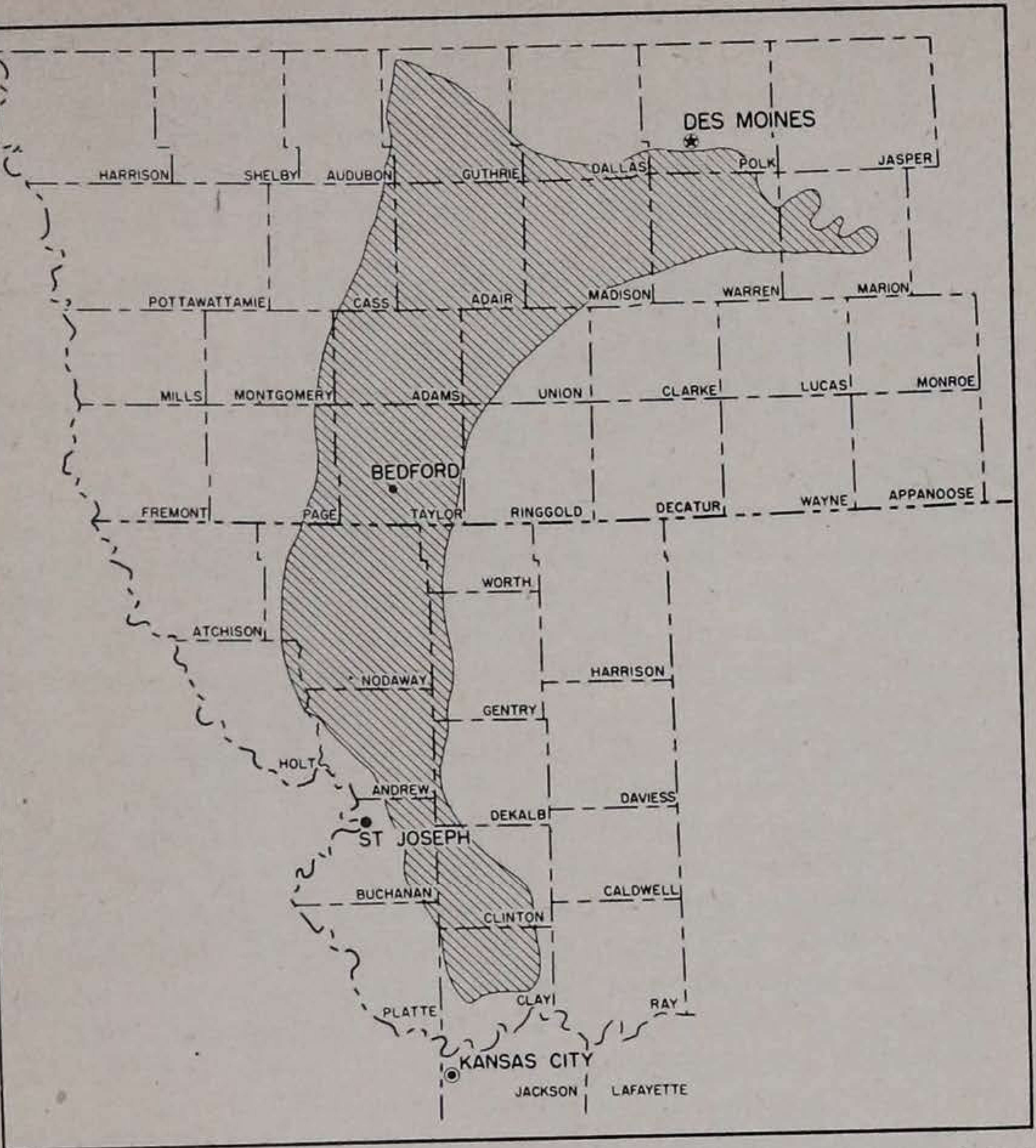


FIGURE 10.—Sharpsburg soils occur in Iowa and Missouri as shown by shaded area. They are among the most productive soils of the uplands in this area.

about the productivity of the surrounding soil. See table 3, page 18, for estimates of yields of different field crops on Sharpsburg soils.

Sharpsburg silty clay loam, 0–2% slopes (RA)

Sharpsburg silty clay loam, 0–2% slopes, occurs in scattered small upland flats, mostly in the northeastern part of the county. Its profile is similar to that just described for the Sharpsburg soils, except that it has a very deep surface soil that may be 16 inches thick. The level topography has prevented erosion, but runoff waters from this soil may cause erosion on lower lying slopes.

Use and management.—This soil has little or no erosion problem. It has a permeable subsoil and is well drained. The fertility level

968972—54——4

is naturally high. Crop yields are high if a good rotation is used. For highest crop yields some lime should be added to correct soil acidity. Soil tests should be made to determine lime needs. Fertilizer should be used according to soil tests and recommendations of the county extension director. A corn-corn-oats-meadow rotation is suggested for this soil.

Sharpsburg silty clay loam, 2–6% slopes (Rb)

Sharpsburg silty clay loam, 2–6% slopes, has the profile previously described for Sharpsburg soils and is found in the uplands. A corresponding soil is found on high benches along the larger stream bottoms.

Use and management.—This soil is well suited to general crop production. As a result, it is farmed intensively, but because it occurs on slopes, it presents an erosion problem. To keep erosion within safe limits, certain practices should be used. Meadow crops should be grown frequently to control erosion. If corn is contoured and the land is terraced, however, meadow crops can then be reduced to a minimum. If erosion is controlled, high corn yields can be maintained with a corn-corn-oats-meadow rotation. Barnyard manure should be added on the second-year corn in this rotation; otherwise, lack of sufficient nitrogen may reduce corn yields that year.

Lime should be added to this soil to obtain best growth of legume-grass meadow. Soil tests may also indicate a need for phosphate. With the suggested rotations, a complete commercial fertilizer applied either in the hill or row will often increase corn yields.

Suggested management and rotations:

1. Lime according to soil test.
2. Start erosion control practices and suitable rotations as follows:
   - Without terraces or contour cultivation, use corn, oats, meadow; or corn, oats, meadow, meadow.
   - With contour cultivation, use corn, corn, oats, meadow, meadow.
   - With contour cultivation and terraces, use corn, corn, oats, meadow.
3. Use fertilizer according to soil tests and recommendations of the county extension director.

Sharpsburg silty clay loam, 2–6% slopes, bench position (Rc)

Sharpsburg silty clay loam, 2–6% slopes, bench position, occurs on benches bordering stream bottoms and is designated by the symbol (Rc) to distinguish it from that occurring in uplands. The soil on benches is virtually identical to that in the uplands. It may have a higher water table, however, and it is sometimes subject to wash and deposition from adjoining upland slopes. The use and management recommendations are the same as those for Sharpsburg silty clay loam, 2–6% slopes.

Sharpsburg silty clay loam, 2–6% slopes, eroded (RD)

Sharpsburg silty clay loam, 2–6% slopes, eroded, has a profile similar to that previously described for Sharpsburg soils, except that it has lost part of its surface soil by erosion. It has from 3 to 10 inches of surface soil remaining. Too much corn in the past probably caused this erosion.

Use and management.—The suggestions made for Sharpsburg silty clay loam, 2–6% slopes, apply to this soil. Heavy manure applications or an additional year of meadow are suggested until the fertility has been raised to a satisfactory level.

Sharpsburg silty clay loam, 7–11% slopes, eroded (RE)

Sharpsburg silty clay loam, 7–11% slopes, eroded, has the Sharpsburg profile previously described, except that all but about 3 to 10 inches of the surface soil has been eroded away.

Use and management.—The control of erosion is the biggest problem on this soil. Meadow crops should be grown often, and erosion control practices used. If contouring and terracing practices are used, the frequency of meadow crops can be reduced. Barnyard manure should be applied for second-year corn.

This soil has lost some organic matter through erosion of the surface soil. Nitrogen and phosphorus in the organic matter were also lost. The fertility of the soil therefore has to be restored, and lime must be supplied according to soil test to correct acidity. A complete commercial fertilizer applied in the hill or row will often increase the yields of corn. Soil tests, however, should be used as a guide to the use of phosphorus and potash fertilizer.

The management suggestions are as follows:

1. Lime according to soil test.
2. Start erosion control practices and suitable rotations as follows:
   Without terraces or contour cultivation, use corn, oats, meadow, meadow, meadow.
   With contour cultivation, use corn, corn, oats, meadow, meadow, meadow.
   With terraces and contour cultivation, use corn, corn, oats, meadow, meadow.
3. Use fertilizer according to soil tests and recommendations of the county extension director.

SHELBY SOILS

Shelby soils, covering the greatest area in Taylor County, include:

Shelby silt loam, 7–11% slopes (SA).
Shelby silt loam, 7–11% slopes, eroded (SB).
Shelby silt loam, 12–16% slopes (SC).
Shelby silt loam, 12–16% slopes, eroded (SD).
Shelby silt loam, 17–30% slopes, eroded (SE).

A few uneroded areas of Shelby soil are on 17- to 30-percent slopes, but they are not separated from the uneroded areas on these slopes. The soils on different slopes are mapped separately because slope affects soil management. As slopes increase, erosion hazard increases.

These soils are on sloping hillsides throughout most of the county. They occur below the ridge-top Sharpsburg and Ladoga soils and next to the sloping Lagonda-Clarinda and Gara soils. They have developed from glacial till, which is a mixture of clay with sand and gravel deposited by glaciers. In many places small quantities of loess, a silty windblown deposit, are mixed in the surface layer. The original vegetation on Shelby soils was prairie grasses.

SOIL PROFILE (UNERODED SOILS).—The surface soil, about 7 inches thick, is dark-brown friable silt loam. The subsurface layer is lighter brown granular silt loam or loam. Beginning at 10 inches, the subsoil is yellowish-brown clay loam with small pebbles and stones scattered throughout. Below this the material is a gritty clay loam. Pockets of sand or gravel may be found. Occasional seams of lime are present at depths of 4 to 5 feet.

Because the Shelby soils occur on slopes, surface runoff is rapid. Under cultivation erosion is a serious problem. Suitable methods for erosion control are frequent use of meadow crops, contouring intertilled crops, terracing, or keeping the land in permanent pasture or timber. Erosion of the surface soil is important because it affects management. Eroded soil must be built up by adding organic matter. Fertilizer also may be needed. The less steeply sloping Shelby soils can be used for corn. If erosion is to be controlled, however, this corn must be contoured. To hold erosion to a minimum, graded terraces should also be used where the slopes are less than 12 percent.

On the steeply sloping Shelby soils (12 percent or more) terraces are not especially effective in controlling erosion. These steep soils are therefore best suited to pasture. To obtain best growth pasture should be well managed.[11] Such management includes fre-

[11] Detailed information on management of pastures is contained in bulletins that can be obtained upon request from the county extension director or Iowa State College, Ames.

quent renovations to introduce legumes, and application of lime, phosphate, and potash according to need shown by soil tests. Yield estimates for different field crops on Shelby soils are in table 3, page 19.

A special symbol, S, shown on the map, indicates areas of about 5 acres or less that have lost all of their surface soil by erosion. Severely eroded areas of Shelby soil are low in productivity. These areas should be kept in permanent vegetation to prevent serious gully erosion. Applications of lime, fertilizer, and manure will probably be necessary for the successful establishment of grass.

Shelby silt loam, 7–11% slopes (SA)

Shelby silt loam, 7–11% slopes, has a profile similar to that previously described for Shelby soils and has about 8 to 10 inches of surface and subsurface soil.

Use and management.—Erosion is a problem. Unless it is controlled, cultivation may result in serious damage to the soil. Pasture or frequent meadow crops will minimize erosion.

When maximum corn production is desired, contour cultivation should be practiced. Graded terraces can also be used to supplement contour cultivation. Suitable rotations should be followed. For highest corn yields manure should be applied to second-year corn.

This soil is acid and will need lime. Phosphate should be added when legume seedings are established. Soil tests should be made, however, to determine lime and fertilizer needs.

The management suggested is as follows:

1. Lime according to soil test.
2. Start erosion control practices and suitable rotations as follows:
   - Without terraces and contour cultivation, use a rotation of corn, oats, meadow, meadow, meadow.
   - With contour cultivation, use a rotation of corn, oats, meadow, meadow.
   - With graded terraces and contour cultivation, use corn, corn, oats, meadow, meadow.
3. Use fertilizer according to soil tests and recommendations of the county extension director.

Shelby silt loam, 7–11% slopes, eroded (SB)

Shelby silt loam, 7–11% slopes, eroded, has less surface soil, but its profile is otherwise like that previously given for Shelby soils. Owing to erosion, about 5 to 8 inches of surface soil remains.

Use and management.—Further erosion should be prevented on this soil. If the remaining surface soil is lost, profitable crop production on the subsoil may be impossible. Corn should not be grown unless it is contoured. Even if it is contoured, the proportion of meadow crops in the rotation should be high. The rotation can be safely shortened only if terracing is practiced.

Erosion of the surface soil has resulted in loss of organic matter, and the fertility level is low. For increased yields, the fertility of the soil should be built up. Heavy applications of barnyard manure should be made, lime added to correct acidity, and phosphate fertilizer added when legume seedings are made. Soil tests, however, should be made to determine lime and fertilizer needs.

The management suggestions are as follows:

1. Lime according to soil test.
2. Start erosion control practices and suitable rotations as follows:
   Without terrace and contour cultivation, use oats, meadow, meadow, meadow.
   With contour cultivation, use corn, oats, meadow, meadow, meadow.
   With graded terraces and contour cultivation, use corn, oats, meadow, meadow.
3. Use fertilizer according to soil tests and recommendations of the county extension director.

Shelby silt loam, 12–16% slopes (Sc)

Shelby silt loam, 12–16% slopes, has a profile corresponding to that previously described for Shelby soils. Erosion has not removed much surface soil; about 8 to 10 inches remains. In the past this soil has been mostly used for pasture.

Use and management.—Because of its steeper slopes this soil is not well suited to corn. Terracing of such slopes is not advised. Runoff is rapid under cultivation, and erosion is serious. This soil is therefore best suited to permanent pasture.

In a long rotation, corn can be grown occasionally on this soil. If it is contoured, a rotation of corn, oats, meadow, meadow, meadow is suggested. Fertilizer should be used in this rotation according to soil tests and the recommendations of the county extension director. Phosphates are most often needed for legume crops, and complete commercial fertilizer often increases corn yields.

Shelby silt loam, 12–16% slopes, eroded (SD)

Shelby silt loam, 12–16% slopes, eroded, has the profile previously described for Shelby soils, except that erosion has removed part of the surface soil. About 2 to 8 inches remains. The degree of erosion indicates that too much corn has been grown in the past.

Use and management.—This eroded soil is not suited to corn. Slopes are too steep for terraces, and contouring will not control erosion. Use of this soil for corn will therefore result in severe erosion. Once the surface soil is completely removed, even grass may be difficult to establish.

Permanent pasture is recommended for this soil. An alternative to pasture is a legume-grass meadow, renewed when necessary with a nurse crop of oats. A corn crop should not intervene between plowing out and reseeding of meadows. If this soil is used for meadow, fertilizer should be applied according to soil tests. Phosphate is usually needed for legumes.

Shelby silt loam, 17–30% slopes, eroded (SE)

Shelby silt loam, 17–30% slopes, eroded, is one of the minor soils in the county. Its profile is like that previously described for Shelby soils, except that erosion under past management has left only 2 to 7 inches of surface soil.

Use and management.—This soil should be in permanent pasture. It is doubtful that corn should ever be grown on it. When pastures become unproductive and require renovation, the land should be fall plowed and the new seeding made with a nurse crop of oats early the following spring. The oats can be grazed off.

WABASH SOILS

The Wabash soils have developed from fine-textured sediments washed from the uplands. They are most often next to the Nodaway and Humeston soils of the bottom lands. The Wabash soils include:

Wabash silty clay loam, 0–1% slopes (WA).
Wabash silty clay, 0–1% slopes (WB).

SOIL PROFILE (WABASH SILTY CLAY LOAM).—The 24-inch surface soil is black to very dark-gray friable silty clay loam. Below this layer is the subsoil, a very dark-gray compact silty clay only slowly or very slowly permeable to water.

Wabash silty clay loam, 0–1% slopes (WA)

Wabash silty clay loam, 0–1% slopes, is on low level bottom lands. It has a lighter textured surface soil than Wabash silty clay, which is locally called gumbo. Below a depth of 24 inches, however, both soils have a similar subsoil.

Surface drainage of Wabash silty clay loam is poor. Water penetrates the tight subsoil slowly; therefore, it is often wet. Tile will not draw well in this soil. Surface ditches or bedding will help remove excess water. See page 27 for a discussion of bedding.

Use and management.—Because Wabash silty clay loam, 0–1% slopes, occurs on low bottoms, it is sometimes overflowed. Overflow damage, however, has been largely eliminated by deepening and straightening stream channels.

Where this soil is protected from overflow, it is well adapted to cultivation. Corn can be grown frequently, and yields maintained. See table 3, page 19, for estimated yields of crops grown on Wabash soils. Good rotations for this soil are corn, soybeans, oats, meadow; corn, corn, oats, meadow; corn, oats, wheat, meadow.

Lime probably will not be needed on this soil. Fertilizer should be used according to soil tests and recommendations of the county extension director.

Wabash silty clay, 0–1% slopes (WB)

Wabash silty clay, 0–1% slopes, has a profile similar to that of Wabash silty clay loam, except that it has a somewhat shallower, heavier surface soil (more clay). Lime may also occur at depths below 30 inches. The surface soil, being only slowly permeable to water, is wetter and more difficult to farm than that of Wabash silty clay loam.

Use and management.—Drainage is a problem on this soil. Surface drainage is very slow because the soil occupies flats or depressions. The surface soil and subsoil allow water to pass through slowly or very slowly; therefore, this soil is often used for permanent pasture. It will produce a good growth of pasture grasses.

Surface ditches or bedding will help drain off excess water. If the soil is drained and protected from overflow, cultivated crops can be grown. A corn-soybeans-oats-meadow rotation is suitable. Corn will yield moderately well. Soybeans and wheat are relatively better adapted. Meadow crops will grow well, but the wetness will cut alfalfa yields.

Phosphate may increase yields of wheat and of legume-grass meadows. Complete commercial fertilizer, applied in the hill to the corn, may also increase yields. Fertilizer should be used according to soil tests and recommendations of the county extension director.

WINTERSET SOILS

The Winterset soils have a deep dark surface soil. They are very fertile and are among the most productive soils in southern Iowa. They have developed from a silty wind-blown deposit called loess. The original vegetation was grass. The Winterset soils, occurring largely on the flats in the northeastern part of the county, include:

Winterset silty clay loam, 0–1% slopes (WM).
Winterset silty clay loam, 0–1% slopes, bench position (WN).

SOIL PROFILE.—The surface soil is a black friable silty clay loam about 16 inches thick. The subsurface layer, from 16 to 22 inches, is grayish-brown silty clay loam. Beginning at 22 inches, the subsoil is a mixed gray and brownish-yellow silty clay to silty clay loam. At a depth of about 42 inches the soil becomes pale brown and lighter in texture.

Winterset silty clay loam, 0–1% slopes (WM)

Winterset silty clay loam, 0–1% slopes, is found on the level ridge tops above the Sharpsburg soil and above the more sloping Clearfield and Lagonda-Clarinda soils.

Use and management.—This soil is suited to intensive cultivation. It has no erosion problem, is very fertile, and produces excellent crop yields. Short rotations may be used, and yields maintained. A rotation of corn, corn, oats, meadow; or corn, soybeans, oats, meadow can be used.

Because this soil occurs on flats, surface drainage is slow. Most water drains down into the soil; therefore, excess subsoil water must be removed. Otherwise, the soil will become too wet. Tile drains will draw well in this soil and remove surplus water. Surface drains may also help.

Plant nutrients are ample for most crop needs. With good management, fertilizer will not often be needed, except as hill applications. Fertilizer should be used according to soil tests and the recommendations of the county extension director.

Winterset silty clay loam, 0–1% slopes, bench position (WN)

Winterset silty clay loam, 0–1% slopes, bench position, occurs on level high benches along large stream bottoms. This soil is practically identical to Winterset silty clay loam, 0–1% slopes, that occurs on the uplands, and would therefore have the same use and management. It was separated on the soil map from the upland Winterset soil because it may receive some runoff water from the uplands. Also, water is more likely to be obtainable from shallow wells on the bench positions.

FORMATION AND CLASSIFICATION OF TAYLOR COUNTY SOILS

This section deals with the formation and classification of the different soil series recognized in the county. The factors causing differences in the soil profiles are briefly discussed. A short account of the main soil-forming and weathering processes affecting Taylor County soils is also given. Certain laboratory data on profiles are presented.

SOIL FORMATION

It is common knowledge that soils vary widely in fertility, physical and chemical properties, and productivity. Before the scientific study of soils was undertaken, the reasons for these differences were not understood. In early soil research studies, little experience and knowledge were available to guide the research workers. For example, in early soil research, the soils were often classified according to geological origin of the parent material.

Although classification by parent material is a useful scheme in some instances, it fails to show the differences among many soils. This shortcoming is illustrated by table 7, in which are listed six different soils formed from parent material of similar geologic origin. Studies of this table will show that the surface soil of the six types listed varies from low to high in organic-matter content, and that the different subsoils vary from porous, or moderate in permeability, to tight, or very slow in permeability. As is to be expected, these soils vary widely in crop productivity and adaptation.

The geologic origin and nature of parent material is an important factor in causing soil differences, but research over many years has shown that other factors must be considered in explaining the causes of differences in soils. Other important factors are (1) kind of vegetation, (2) topography, or lay-of-the-land, (3) climate, and (4) length of time the soils have weathered. The ways in which these factors have caused differences in Taylor County soils are discussed briefly.

Origin of soil-forming material.—The three kinds of soil-forming material, or soil parent material, in the county are (1) ice-laid, or glacial, till material; (2) air-borne, or loess, material; and (3) water-laid, or alluvial, material (fig. 3, p. 8). The kinds of materials from which the different soils have formed are given in table 6.

According to geologists (*5*),[12] four glaciers left till deposits in Iowa, and the till in Taylor County was deposited by the two oldest—the Nebraskan and Kansan. The Nebraskan left the first deposit many thousands of years ago, and it was covered by another till deposit when the Kansan glacier covered the whole county.

After the Kansan till was deposited, soils began to form from the glacial till. Streams began to form in many parts of the county, and fingerlike drainageways extended into the upland areas. Surface drainage became well established in most parts. Where a few nearly level areas remained, as those around the towns of Lenox and Clearfield, a soil formed that had a very dense clay subsoil about 10 feet thick. Geologists call this material gumbotil. It may be seen in many

[12] Italic numbers in parentheses refer to Literature Cited, p. 74.

TABLE 6.—*Origin of Taylor County, Iowa, soils*

Soil	Parent soil material	Usual slope range	Native vegetation
		Percent	
Blockton	Alluvium	0–1	Grass, trees.
Clarinda	Glacial till	7–16	Grass.
Clearfield	Loess	2–6	Do.
Gara	Glacial till	7–30	Trees, grass.
Gravity	Alluvium	2–6	Grass.
Humeston	do	0–1	Grass, trees.
Ladoga	Loess	2–11	Trees, grass.
Lagonda	Glacial till	7–16	Grass.
Nodaway	Alluvium	0–2	Grass, trees.
Olmitz	do	2–6	Grass.
Sharpsburg	Loess	0–11	Do.
Shelby	Glacial till	7–30	Do.
Wabash	Alluvium	0–1	Grass, trees.
Winterset	Loess	0–1	Grass.

road cuts in the county and can be identified by its gray color. It is sticky when wet, very slowly permeable to water, and hard when dry. A study of figure 3, page 8, will show how gumbotil occurs in much of the county.

Gumbotil developed only on uplands where there were flats. On gentle slopes the old subsoil, usually about 2 feet thick, was less dense and less thick, although still quite dense and very slowly permeable. On the steeper slopes the soil was removed periodically by geologic erosion, and therefore soil on steeper slopes resembled Kansan till in physical properties. The original unaltered Kansan till was more compact and dense than the later loess. The thick ice had pressed the till together, and therefore unaltered Kansan till is a less favorable material than the loess for the formation of productive soils.

According to geologists (*5*), long after the Kansan till was deposited, loess, or wind-blown silt, was deposited during the Wisconsin glacial age. Loess, or air-borne silt material, can be picked up by strong winds and carried for some distance before being deposited. Winds from the northwest picked up loess from the broad Missouri River bottoms in the vicinity of Harrison and Monona Counties and deposited it in this county. When the Wisconsin glaciers were melting in northern Iowa and Minnesota, the melt water with its load of silt or rock flour flowed partly into the Missouri River. Large bare mud flats were present whenever cold weather checked the melting of the ice, and strong winds from the northwest blew the silt or rock-flour particles over the uplands. The material was then deposited on the upland to the east of the Missouri River, and consequently, every county in southwestern Iowa has considerable loess material.

The loess is thicker in the counties near the river, sometimes over 100 feet thick, and gradually thins as one goes east. In Taylor County the loess is about 180 inches thick in the northwestern part on the level upland areas. Near Blockton it is about 150 inches thick on nearly level ridges of the upland areas. Its thickness is increasingly less in Ringgold and Decatur Counties, and on the upland flats in Wayne County the loess is about 90 to 100 inches thick (*3*).

In Taylor County, if the slope is steeper than 6 to 9 percent, glacial till material is usually present. In the vicinity of Lenox the loess material is about 150 inches thick over the glacial till material. The loess material in Taylor County has no grit or pebbles, whereas the glacial till material has many small pebbles and grit. Shelby and Gara soils have formed from glacial till. Lagonda and Clarinda soils have formed from a thin covering of loess over heavy glacial till material, although the loess material is absent in some places.

Soils formed from loess vary widely in character and productivity. They range from high to low in both fertility and organic-matter content. Some are naturally well aerated and well drained, as Sharpsburg soils; but others are naturally wet and poorly aerated, as Winterset soils. Some have very dense and very slowly permeable subsoils, as do the Edina soils of Wayne County. The characteristics of six soils formed from loess in several Iowa counties are given in table 7.

TABLE 7.—*Characteristics of several Iowa soils formed from loess*

Soil	County	Dominant slope	Organic matter in surface layer	Subsoil permeability	General suitability for corn
		Percent			
Sharpsburg	Taylor	2–6	Medium high	Moderate to slow.	Good.
Winterset	do	0–1	Very high	do	Do.
Ladoga	do	2–6	Medium	Slow	Fair.
Marshall	Montgomery	2–8	do	Moderate	Good.
Edina	Wayne	0–1	Medium to low	Very slow	Fair to poor.
Weller	Decatur	2–5	Low	do	Poor.

Soils formed from loess vary because of differences in slope, kind of natural vegetation under which they developed, the length of time during which they formed, and the extent of weathering undergone. In general the Marshall soils, which have formed from deep loess, are among the best soils from loess in southwestern Iowa. Sharpsburg and Winterset soils are about as good as the Marshall soils. Ladoga, Edina, and Weller soils are not so good as the Sharpsburg.

Alluvium, or water-laid material, occurs on the narrow and broad stream bottoms. Sometimes this material is a recent silty and friable deposit laid down by runoff waters that moved fairly rapidly. The Nodaway soil has developed from such material. Gravity and Olmitz soils have formed from similar material deposited a little earlier. In other places where there was slack or standing water, the material contained considerable clay and formed soils with clay in the surface and subsoil layers. These soils are usually wet. Wabash and Blockton soils have formed from clayey alluvium.

Studies by Kay, Graham, and associates of the Iowa Geological Survey (*3*) indicate that the loess and tills of Iowa are very similar as to mineralogical composition. Hutton (*1, 2*) in studying the maximum loess thickness in Taylor and adjacent counties found the Marshall soils to the west of Taylor County had less clay in the B_2 horizon than the Grundy soils to the east of the county. As Sharpsburg soils were found to be intermediate in properties between Marshall and Grundy series, a relationship between loess thickness and several soil properties was established. Ulrich (*9*) studied the physical properties of the Winterset soils, the level Minden soils to the west of Taylor County, and the level Haig soils to the east of Taylor County. He, too, concluded that a relationship existed between loess thickness and several soil properties.

The loess thickness pattern, according to data by Hutton (*1*) and Ulrich (*9*), is given in figure 11. The point of initial loess deposition, or at zero miles, is on the Missouri River bluff in Monona County, Iowa. Here the loess on almost level uneroded sites is about 700 inches thick. About 170 miles to the southeast in Wayne County, Iowa, the loess thickness on almost level sites is about 90 inches. From figure 11 it is seen that as loess thickness decreases the percentage of clay in the maximum clay-accumulation layer of the profile increases. In Minden soil, profile P–217, the subsoil clay content is about 30 percent. In Winterset soil (P–218) the subsoil clay content is about 40 percent, and 50 and 52 percent for Haig and Edina soils, P–220, and P–16, respectively. Ulrich found that porosity of the soil profile decreased as the loess thickness decreased. This is indicated in figure 12, where the percentages of capillary porosity, aeration porosity, and soil solids are shown graphically.

Time as a factor in formation of Taylor County soils.—As the parent materials of Taylor County soils range in age from post-Wisconsin to Nebraskan glacial ages, the time factor is important in causing differences in Taylor County soils.

The Nodaway soil is formed from recent alluvium and has only slight profile development, or horizon differentiation. In contrast, Lagonda soils have strong horizon differentiation; Lagonda soils would be the normal soils of the pre-loess landscape.

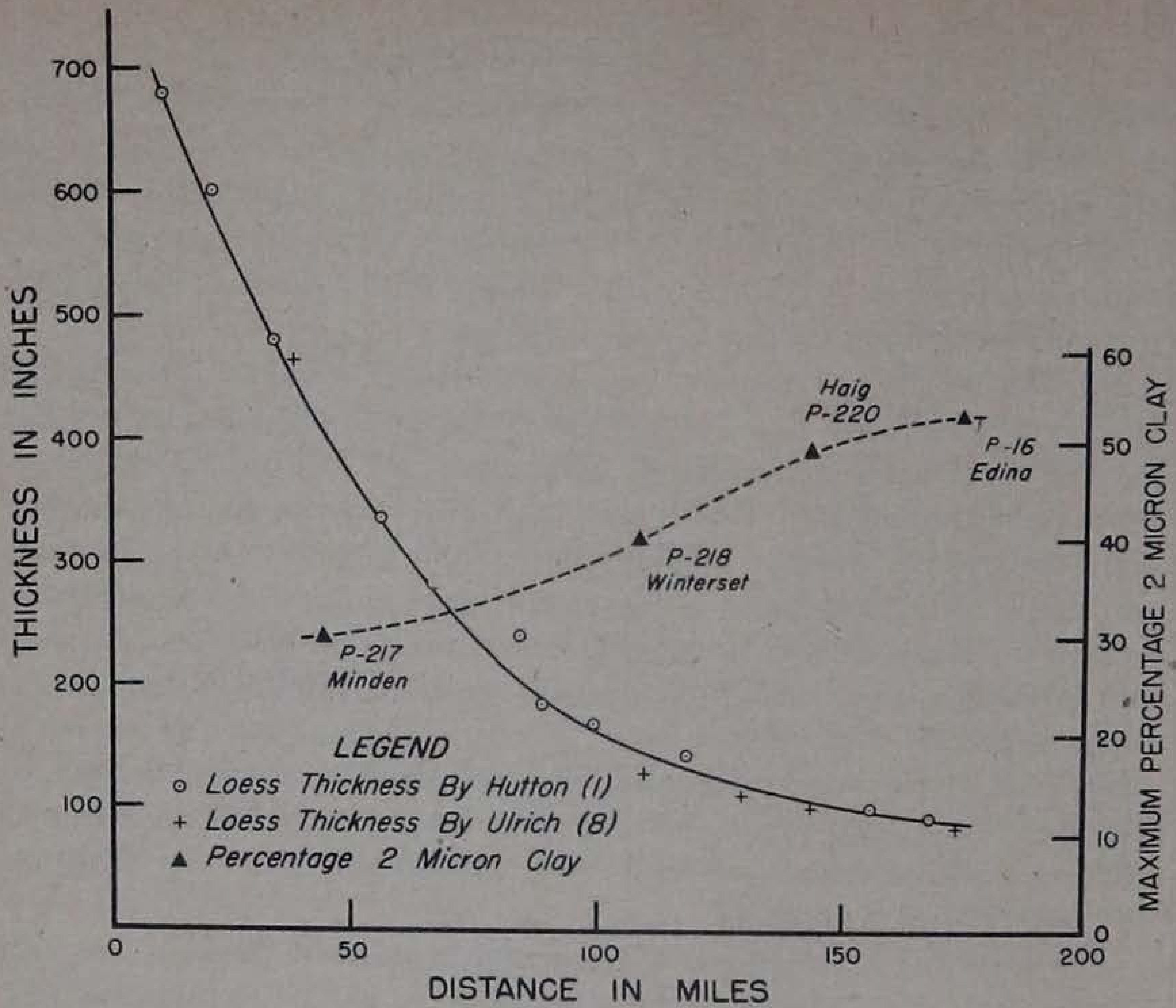


FIGURE 11.—Loess thickness and maximum percentage of clay less than 2 microns in size along a traverse southeastward from Monona County near the Missouri River to Wayne County, Iowa.

Shelby and Gara soils were formed from Kansan and/or Nebraskan till (probably exposed by early Wisconsin dissection rather than by Kansan or early Illinoian dissection). It would seem that if the areas of Shelby and Gara soils were of Kansan or early Illinoian age, a more deeply leached profile like the Lagonda would be present. In some of the Shelby and Gara areas carbonates are present at 3 to 4 feet, and it is thought that such areas are of early Wisconsin (or later) dissection. As the Shelby and Gara soils occupy relatively steep slopes, usually 10 to 15 percent, both geological erosion and site characteristics must be evaluated. It is therefore difficult to correlate their age with that of other series. The age of the Blockton, Humeston, and Wabash soils is also difficult to determine, for the parent material (alluvium) may have been deposited in middle Wisconsin and/or late Wisconsin time, or possibly in post-Wisconsin time.

Previously it was mentioned that loess-derived soils differ in properties. Hutton (*2*), Ulrich (*9*), and Smith (*7*) showed that as loess thickness decreased in a regular manner away from the initial point

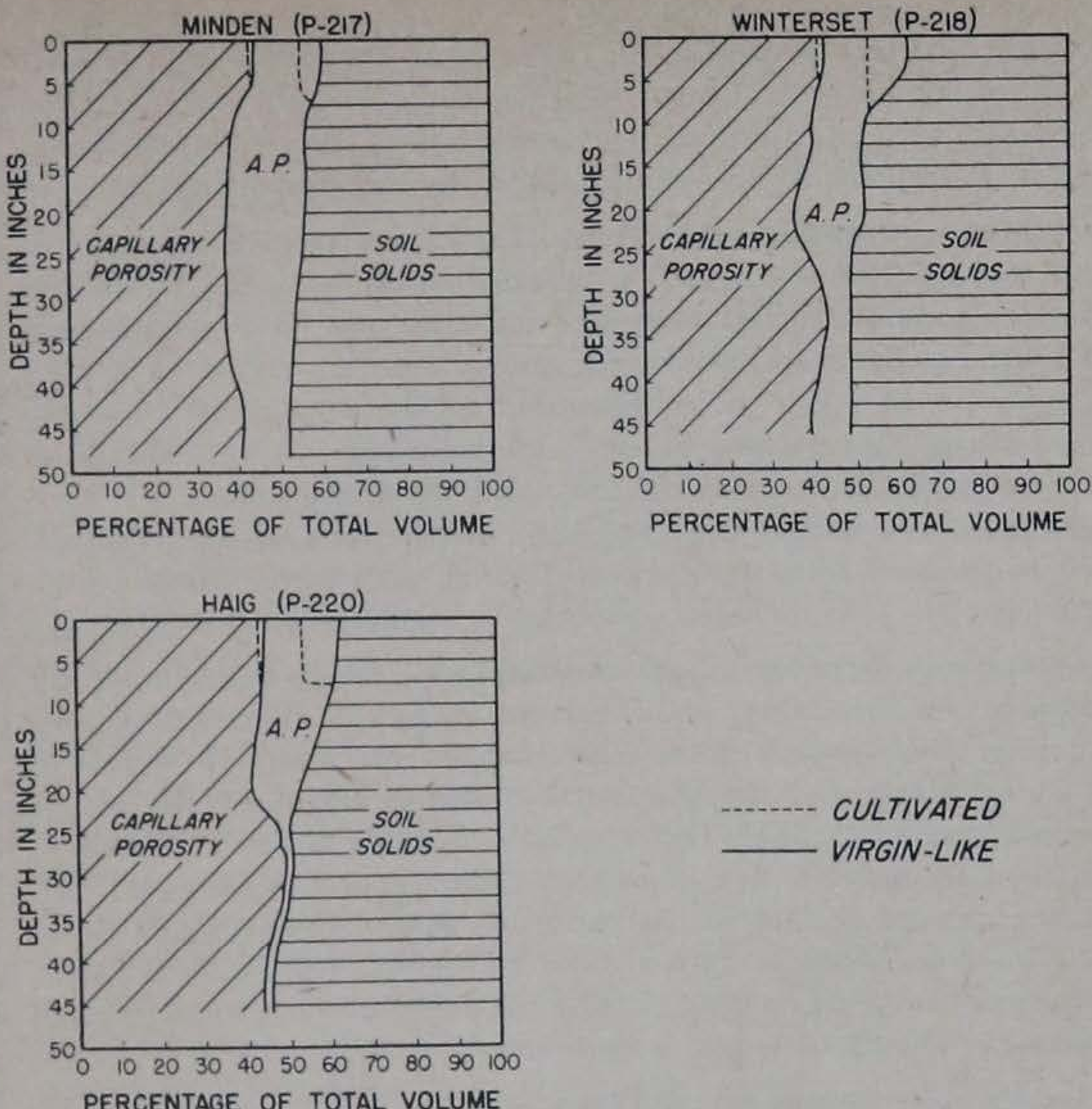


FIGURE 12.—Capillary porosity, aeration porosity (A. P.), and soil solids by depths in the Minden, Winterset, and Haig profiles of figure 11.

of deposition, certain soil properties changed regularly. They suggested that the change in soil properties with decreasing loess thickness—that is, the increased clay content of the subsoil, decrease in aeration porosity, or decrease in organic matter content—were due to greater time of weathering. From figure 11, it is seen that for the Minden soil profile (P–217) the solum, or upper 30 inches, has formed from the upper part of about 400 inches of loess deposit. The Edina solum, profile P–16, has formed from the upper part of about 90 inches of loess material. If the total time for deposition of the loess at all sites in figure 11 were equal, then the upper 30 inches at the site of Edina soil would have been deposited over about one-third of the loess-deposition period. The upper 30 inches of loess at the Minden site would have been deposited in about 30/400, or about 1/13, of the total time of loess deposition. The time of weathering would therefore be least where the loess is thickest and greatest where it is thinnest. It has been recognized that other properties of loess, such as mean particle size, mineral fraction, and carbonate content, might also vary with the thinning pattern (*2, 9, 7*), and these variations might be responsible for the gradation in soil properties.

Influence of native vegetation.—The kind of native vegetation is important in influencing soil properties in the county. The native grasses, principally big bluestem, have fibrous root systems that thoroughly penetrate the soil for about 12 to 15 inches. The soils that developed under grass vegetation, as the Sharpsburg, accumulated considerable organic matter in the surface layer. Winterset soils have formed under mixed grass and marsh vegetation.

Forest vegetation in Iowa produces less organic matter accumulation in the soils than does grass. Ladoga soils have formed under forest growth that included some grassy vegetation.

Climate as a factor in soil formation.—Climate is an important factor in soil formation. Soils formed in the dry climate of eastern Colorado differ greatly from those formed in the humid climate of Georgia. Generally, the greater the rainfall the more the soil is leached of mineral plant nutrients. The rainfall of Taylor County is intermediate between that of eastern Colorado and of Georgia. Although climate is largely the cause of Taylor County soils being different from those of eastern Colorado or of Georgia, it is fairly uniform throughout the county and therefore does not explain differences among the soils in the county.

Topography causes soil differences.—There is little or no runoff of rainfall from the nearly level or level land in Taylor County; therefore, there was usually ample water for growth of vegetation. If the vegetation was mostly grasses, the soil has large quantities of organic matter. Winterset, Wabash, and Gravity soils formed under grass vegetation on nearly level slopes.

Soils formed on level areas often are naturally wet. Usually the subsoil and substrata colors indicate poor aeration. Winterset and Wabash soils have gray to olive-gray poorly aerated subsoils.

If the soil has a moderately steep slope—say about 10 to 20 percent gradient—much of the rainfall runs off. Growth of grassy plants will be limited, and the soil will accumulate less organic matter. Most of the Shelby soils have steep slopes. This explains in part why they have less organic matter than Winterset or Wabash soils. Sharpsburg soils have slopes intermediate between the level Winterset soils and the steeper Shelby soils. Sharpsburg soils, too, have formed under grass and have an intermediate organic-matter content.

Man alters soils.—Past use may alter soils. Changes in soils may result from cultivation. Loss of surface soil through erosion has changed some of the Taylor County soils. Where much of the surface layer has been removed, eroded units are mapped, as in the Shelby and Sharpsburg series.

Changes in soil structure and loss of plant nutrients are also important. The crumbly and granular structure of the surface layer in the Winterset and Blockton soils may be altered to a hard and cloddy structure by cultivation. The granular structure can be restored through legume-grass meadows.

Organic-matter content, under cultivation, generally decreases, even though there is no erosion. Mineral plant nutrients are removed from the soil in grain, straw, and hay. Through lime and fertilizer and proper rotations, however, the soils can be maintained in good structure and fertility.

How the soil profile develops.—After the soil material is deposited, simple forms of life, as bacteria and fungi, invade it. As they grow, multiply, and die, they leave their bodies to decay slowly in the soil material. Soon trees or grasses grow, which also multiply and die, adding organic matter. The upper layer of the soil parent material is no longer the same as the lower layers; the soil profile has started to form. At this early stage of profile development the subsoil has the same characteristics as the soil-forming material. If the slopes are steep, the subsoil layer may change very little from the original soil material, but if slopes are gentle or nearly level, the subsoil may gradually change from the original soil material.

In Taylor County the thickness and color of the surface layers vary in different soils because of slope, vegetation, and age of the soil parent material. The subsoil layers also vary in the different soils. In Sharpsburg soils, the subsoil layer is yellowish brown because it is naturally well aerated, or has good oxidation. In the Winterset soils, the subsoil is gray to olive gray because it is naturally poorly aerated, or poorly oxidized. Some soils have dense slowly permeable subsoil, and others have more open and moderately permeable subsoil. Lagonda and Clarinda soils have a dense tight subsoil because of their great age. During the many thousands of years these soils have been forming, the content of clay, which was not present in great quantities in the original soil material, has gradually increased. In Sharpsburg soils some clay has formed through weathering of both the surface and subsoil layers, but most of it is found in the subsoil. The Blockton soil has considerable clay in the subsoil, whereas the Nodaway has little. Sketches of a number of profiles are shown in figure 3.

968972—54——5

Weathering of the silt particles to form clay is an important process in producing differences in the soils of this county. Leaching of mineral plant nutrients, as calcium and potassium, also is important. Leached soils are usually acid. The Blockton, Sharpsburg, Ladoga, and Gara soils have been moderately leached, whereas the Wabash soils have not been leached to any great extent.

Soil genesis and weathering trends in Taylor County soils.—Few laboratory studies have been made on the genesis of Taylor County soil series; therefore, it is necessary to refer to studies made on related or similar series in the general area. Marbut (*4*) studied a profile of Marshall soils collected in Fremont County and placed the Marshall profile with the Prairie (Brunizem) great soil group on the evidence of lack of carbonate accumulation within the solum. Hutton (*2*) found no zone of carbonate accumulation for profiles of Sharpsburg, Marshall, and Grundy soils collected in south-central and southwestern Iowa. He studied the clay fractions of a profile sample of Sharpsburg soil and found the clay to be of the montmorillonite type. From data for potash, calcium, and magnesium content of the clay, Hutton suggests that the Sharpsburg soils are only relatively slightly weathered. These data are in essential agreement with data given by Marbut for Marshall soils.

Ulrich (*9*) studied in considerable detail the distribution of clay and the various physical properties of a Winterset soil, and of a Minden and a Haig soil to the west and east, respectively, of Taylor County. The maximum clay content of the solum, the A+B horizons, is plotted in figure 11. He found the aeration porosity of the Winterset soil to be intermediate between that of the Haig and the Minden (fig. 12). From these data and from field observations, it is evident that the Minden soil has good physical properties for water movement, but that the Haig soils have developed a claypan B horizon which interferes with water movement. Winterset soils are intermediate between the Haig and Minden soils in regard to properties affecting water movement.

Wilson, Riecken, and Browning (*10*) studied the physical properties of a Sharpsburg soil and found both the B and C horizons to have permeability somewhat similar to that of the Marshall soils. Little difference was noted between the B and C layers. Noncapillary porosity was about 8 to 10 percent, and the volume weight about 1.3 to 1.4. In contrast, a Grundy profile was found to have lower permeability, higher volume weight, and lower noncapillary porosity in the B than in the C layer. Hutton (*2*) concluded that in the Grundy profile illuviation of fine clay into the B layer from the A layer has taken place.

Middleton, Slater, and Byers (*5*) and Smith and Rhoades (*8*) have studied the physical characteristics of some soils derived from Kansan and Nebraskan till. They found that the volume weights of the till were about 1.5 to 1.8, and that porosity and permeability were low. As the till was once covered by heavy ice, it is more compacted than air-transported loess. The Shelby, Gara, Lagonda, and Clarinda soils, which are mostly derived from till or weathered till, have subsoils poorer in physical properties than do the Sharpsburg and Winterset soils. Differences in physical properties among these soils are due to the degree the till has weathered and to the extent illuviation of fine clay has taken place. The calcareous till of Taylor County was not found to be greatly variable in physical characteristics.

CLASSIFICATION OF TAYLOR COUNTY SOILS INTO GREAT SOIL GROUPS (*6*)

The soil series of Taylor County are classified according to great soil groups as follows:

Brunizem (Prairie) soils:
- Sharpsburg
- Shelby
- Lagonda
- Gravity
- Olmitz
- Ladoga
- Clearfield
- Gara

Wiesenboden (Humic Gley) soils:
- Winterset
- Wabash
- Clarinda

Planosols:
- Blockton
- Humeston

Alluvial soils:
- Nodaway

LABORATORY DETERMINATIONS

Mechanical analyses of five soils in Taylor County, Iowa, are given in table 8.

PROFILE DESCRIPTIONS

Following are detailed profile descriptions representative of the different soil series in Taylor County. The place in the county where each description was taken is given. In most instances the analytical data for the soils listed in table 8 were obtained from samples taken at the location where the profile was described.

Blockton silt loam; location, SW¼SW¼ sec. 29, T. 70 N., R. 35 W.:

A_1 0 to 10 inches

Grayish-brown to very dark-gray (10YR 4/2 to 3/1)[13] when moist,

[13] Symbols represent Munsell color notations.

TABLE 8.—*Mechanical analyses*[1] *of 5 soils in Taylor County, Iowa*

Soil name and sample No.	Depth	Organic carbon[2]	Organic matter[3]	Sand (>0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (<0.002 mm.)	pH[4]
		Percent	*Percent*	*Percent*	*Percent*	*Percent*	
Clarinda silty clay loam; location, SW¼NW¼ sec. 3, T. 68 N., R. 34 W.:							
47–Io–87–4–1	0–7	----------	6. 4	3. 8	64. 1	32. 1	5. 8
47–Io–87–4–2	7–13	----------	4. 0	3. 7	69. 3	27. 0	5. 6
47–Io–87–4–3	13–21	----------	1. 6	4. 7	45. 7	49. 6	5. 4
47–Io–87–4–4	21–31	----------	. 6	4. 8	41. 2	54. 0	5. 5
47–Io–87–4–5	31+	----------	0	4. 6	44. 1	51. 3	5. 5
Nodaway silt loam; location, SE¼NE¼SE¼ sec. 27, T. 70 N., R. 34 W.:							
47–Io–87–7–1	0–5	2. 4	----------	8. 9	66. 4	24. 7	6. 2
47–Io–87–7–2	5–11	2. 6	----------	9. 7	66. 5	23. 8	5. 8
47–Io–87–7–3	11–16	2. 6	----------	12. 5	63. 9	23. 6	5. 9
47–Io–87–7–4	16–24	1. 4	----------	13. 4	64. 6	22. 0	6. 1
47–Io–87–7–5	24–30	1. 4	----------	10. 7	66. 8	22. 5	5. 8
47–Io–87–7–6	30–36	1. 0	----------	7. 5	69. 1	23. 4	5. 6
47–Io–87–7–7	36+	1. 0	----------	5. 7	70. 6	23. 7	5. 5
Sharpsburg silty clay loam; location, SW¼SW¼ sec. 30, T. 70 N., R. 32 W.:							
3396–21X	0–3	----------	7. 4	3. 9	64. 9	31. 2	6. 1
3396–22X	3–10	----------	4. 9	2. 2	64. 1	33. 7	5. 5
3396–23X	10–15	----------	4. 3	1. 7	63. 3	35. 0	4. 8
3396–24X	15–19	----------	3. 5	1. 9	61. 7	36. 4	5. 4
3396–25X	19–23	----------	1. 5	1. 6	60. 7	37. 7	5. 6
3396–26X	23–34	----------	1. 4	1. 8	59. 0	39. 2	5. 6
3396–27X	34–40	----------	. 5	2. 2	61. 8	36. 0	5. 2
3396–28X	40–51	----------	. 3	1. 9	63. 2	34. 9	5. 4
3396–29X	51–55	----------	. 2	1. 6	64. 8	33. 6	5. 9

Wabash silty clay; location, SE¼NE¼SE¼ sec. 9,

Wabash silty clay; location, SE¼NE¼SE¼ sec. 9, T. 68 N., R. 35 W.:							
47-Io-87-11-1	0–6	2. 5	----------	2. 6	52. 3	45. 1	6. 9
47-Io-87-11-2	6–10	2. 7	----------	2. 3	55. 3	42. 4	7. 2
47-Io-87-11-3	10–15	1. 1	----------	1. 8	51. 2	47. 0	7. 6
47-Io-87-11-4	15–20	. 4	----------	1. 5	50. 6	47. 9	7. 7
47-Io-87-11-5	20–27	. 1	----------	2. 6	53. 1	44. 3	7. 9
47-Io-87-11-6	27–39	0	----------	2. 4	51. 9	45. 7	7. 7
Winterset silty clay loam:							
3396-13X	0–8	----------	4. 5	2. 3	69. 1	28. 6	5. 8
3396-14X	8–15	----------	4. 2	2. 3	66. 2	31. 5	5. 4
3396-15X	15–22	----------	3. 2	2. 6	63. 4	34. 0	4. 8
3396-16X	22–27	----------	2. 5	2. 8	61. 4	35. 8	5. 2
3396-17X	27–32	----------	1. 4	2. 3	57. 9	39. 8	6. 0
3396-18X	32–40	----------	. 7	2. 4	57. 2	40. 4	5. 9
3396-19X	40–48	----------	. 7	2. 0	59. 5	38. 5	5. 3
3396-20X	48–50	----------	. 5	1. 9	60. 9	37. 2	5. 8

[1] Analyses by pipette method, using hydrogen peroxide to destroy organic matter and sodium hexametaphosphate plus sodium carbonate as dispersing agent. Data expressed in percentages on oven-dry basis and compiled under supervision of L. T. Alexander, Bureau of Plant Industry, Soils, and Agricultural Engineering, United States Department of Agriculture.

[2] By wet combustion method.

[3] By hydrogen peroxide oxidation.

[4] By glass-electrode method.

and gray to grayish-brown (10YR 5/1 to 5/2) when dry, friable light silty clay loam to heavy silt loam of fine granular to fine crumb structure. Grades into—

A_2 10 to 15 inches
Grayish-brown to dark gray (10YR 4/2 to 4/1) when moist, and grayish-brown to gray (10YR 5/2 to 5/1) when dry, heavy silt loam to light silty clay loam of fine granular structure; structure particles have slight to heavy light-gray coating. Rests abruptly on—

B_2 15 to 27 inches
Very dark-brown (10YR 2/2 to 3/2) when moist, compact silty clay to clay; moderate medium blocky structure with aggregates arranged in very weakly developed prisms. Grades into—

B_3 27 to 40 inches
Light brownish-gray (10YR 6/2) when moist, silty clay with weak coarse blocky structure; mottled with brownish yellow.

Clarinda silty clay loam:

A_{11} 0 to 7 inches
Black (10YR 2/1) when moist, friable heavy silt loam or silty clay loam with moderate fine to medium crumb or granular structure. Grades into—

A_{12} 7 to 13 inches
Very dark-gray (10YR 3/1) when moist, silty clay loam with moderate fine to medium structure. Grades into—

B_{21g} 13 to 21 inches
Olive-gray to grayish-brown (5Y 5/2) when moist, plastic silty clay with moderate fine blocky structure, low contrast mottles of yellow, and some gray coatings (N 4 to N 5). Grades into—

B_{22g} 21 to 31 inches
Light olive-gray to light-gray (5Y 6/2) when moist, very plastic silty clay to clay with moderate fine to medium blocky structure and low-contrast mottles of yellow. Grades into—

C_g 31 inches +
Color and texture unchanged from above, but material somewhat more compact.

Clearfield silty clay loam; location, NE½NE¼ sec. 6, T. 70 N., R. 32 W.:

A_{11} 0 to 10 inches
Very dark-grayish brown (10YR 2/2 to 3/1) when moist, to dark-gray (10YR 4/1) when dry, friable light silty clay loam with moderate medium granular structure. Grades into—

A_{12} 10 to 18 inches
Dark grayish-brown (10YR 3/2) when moist, friable silty clay loam with moderate fine granular structure. Grades into—

B_2 18 to 30 inches
Grayish-brown (10YR 4/2) when moist, compact heavy silty clay loam heavily mottled with yellowish brown, dark red, and light brown; moderate medium to coarse blocky structure. Grades into—

B_3 30 to 42 inches
Pale-brown (10YR 6/3) when moist, silty clay loam, heavily mottled with brownish yellow; weak very coarse blocky structure. Grades into—

C 42 inches +
Pale-brown to brownish-gray (10YR 6/3 to 6/2) when moist, moderately friable silty clay loam strongly mottled with dark brown; massive structure.

Gara silt loam (uneroded soil); location, SE¼SE¼ sec. 17, T. 69 N., R. 35 W.:

A_1 0 to 7 inches
Dark-gray to grayish-brown (10YR 4/1 to 4/2) when moist, friable silt loam of moderate fine granular structure. Grades into—

AB 7 to 13 inches
Brown to dark yellowish-brown (10YR 4/4) when moist, friable clay loam of moderate coarse granular structure. Grades into—

B_2 13 to 20 inches
Brown to yellowish-brown (10YR 5/3 to 5/4) when moist, sandy clay to clay loam of moderate medium subangular blocky structure. Grades into—

B_3 20 to 29 inches
Brown to yellowish-brown (10YR 5/3 to 5/4) when moist, gritty clay loam to sandy clay mottled with lighter yellowish brown (10YR 5/6 to 5/8) and having moderate coarse blocky structure. Grades into—

C 29 inches +
Light brownish-gray to grayish-brown (2.5Y 6/2 to 5/2) when moist, gritty clay to sandy clay mottled with yellowish brown (10YR 5/8). Numerous gravel pebbles occur throughout layer. Occasional lime concretions are encountered.

Gravity silty clay loam; location, NW¼NW¼ sec. 15, T. 67 N., R. 35 W.:

A_{11} 0 to 8 inches
Dark grayish-brown to very dark-brown (10YR 3/2 to 2/2) when moist, friable silty clay loam with moderate medium granular to crumb structure. Grades into—

A_{12} 8 to 16 inches
Dark grayish-brown (10YR 3/2) when moist, friable silty clay loam with weak medium granular structure. Grades into—

B_2 16 to 30 inches
Moderately compact grayish-brown to brown (10YR 4/2 to 4/3) when moist, silty clay loam mottled with yellowish brown and gray and having moderate medium blocky structure. Grades into—

B_3 30 to 40 inches
Grayish-brown (10YR 5/2) friable when moist, silty clay loam to silt loam, mottled with gray and yellowish brown and having weak coarse blocky structure.

Humeston silt loam; location, SE¼SW¼, sec. 10, T. 67 N., R. 35 W.:

A_1 0 to 15 inches
Gray to light brownish-gray (10YR 6/1 to 6/2) when dry or gray to dark-gray (10YR 5/1 to 4/1) when moist, silt loam with moderate crumb structure. Grades into—

A_2 15 to 21 inches
Light-gray (10YR 7/1) when dry, to gray (10YR 6/1 to 5/1) when moist, silt loam with numerous brownish-yellow (10YR 6/6) mottlings and weak platy structure. Rests abruptly on—

B_2 (A_{11b}) 21 to 27 inches

Very dark-gray to very dark grayish-brown (10YR 3/1 to 3/2) when moist, silty clay loam, with prismatic structure; prism centers gray (10YR 5/1).

A_{12b} 27 to 48 inches

Very dark-gray to black (10YR 3/1 to 2/1) when moist, compact heavy silty clay to clay with numerous small concretions.

B_{bg} 48 inches +

Pale-brown (10YR 6/3) when moist, silty clay loam with numerous mottlings of brownish yellow (10YR 6/8); contains many manganese concretions and has a massive structure.

Ladoga silt loam; location, SW¼SE¼ sec. 16, T. 70 N., R. 35 W.:

A_p 0 to 8 inches

Dark grayish-brown (10YR 3/2) when moist, friable silt loam with granular structure. Grades into—

AB 8 to 12 inches

Brown (10YR 4/3) when moist, light silty clay loam with fine subangular blocky structure. Grades into—

B_{21} 12 to 30 inches

Dark yellowish-brown (10YR 4/4) when moist, compact silty clay loam to silty clay mottled with grayish brown and olive gray; moderate medium subangular to angular blocky structure. Grades into—

B_{22} 30 to 42 inches

Mottled yellowish-brown (10YR 5/4) when moist, heavy silty clay loam to silty clay with moderate medium blocky structure. Grades into—

B_3 42 inches +

Yellowish-brown (10YR 5/6) when moist, silty clay loam with weak coarse blocky structure.

Lagonda silt loam:

A_1 0 to 12 inches

Dark grayish-brown to very dark grayish-brown (10YR 3/2 to 4/2) when moist, silt loam with fine granular structure. Grades into—

AB 12 to 18 inches

Dark-gray to dark grayish-brown (10YR 4/1 to 4/2) when moist silty clay loam faintly mottled with rust-brown iron stains; medium fine blocky structure, the granules being coated with a thin dark-colored film. Grades into—

B_{21} 18 to 24 inches

Dark-gray to dark grayish-brown (10YR 4/1 to 4/2) when moist silty clay to clay mottled with brownish yellow and some yellow; weak angular blocky structure; varying quantities of fine glacial gravel in the lower part of the layer. Grades into—

B_{22} 24 inches +

Gray to grayish-brown (10YR 5/1 to 5/2) when moist, gritty silty clay to clay highly mottled with brownish yellow and black; number of fragments from disintegrated glacial boulders increases with depth.

Nodaway silt loam; location, SW¼SE¼, sec. 7, T. 70 N., R. 35 W.:

A_1 0 to 20 inches

Grayish-brown (10YR 4/2 to 5/2) when moist, to light brownish-gray (10YR 6/2) when dry, friable silt loam with weak to moderate crumb structure; occasionally a very pale-brown or light-gray coating or splotch in lower part. Grades into—

C 20 to 40 inches
Grayish-brown (10YR 5/2) when moist, friable silt loam weakly to heavily coated or splotched with light gray or very pale brown. Rests abruptly on—

A_{1b} 40 inches +
Brownish-black to black silty clay loam. (A buried soil profile.)

Olmitz silt loam:

A_{11} 0 to 15 inches
Very dark-brown grayish-brown (10YR 2/2 to 4/2) when moist, friable silt loam or loam with moderate medium crumb structure.

A_{12} 15 to 20 inches
Dark grayish-brown (10YR 3/2 to 4/2) when moist, friable loam or silt loam, specked or splotched with gray or light gray; weak crumb structure.

B 20 inches +
Gray to grayish-brown (10YR 5/1 to 5/2) when moist, heavy loam or silt loam splotched with light gray and yellowish brown; massive to weak blocky structure.

Sharpsburg silty clay loam; location, NW¼NE¼, sec. 26, T. 70 N., R. 35 W.:

A_{11} 0 to 4 inches
Dark-gray to dark grayish-brown (10YR 3/1 to 3/2) when moist, silty clay loam with moderate fine granular structure.

A_{12} 4 to 9 inches
Very dark-gray to very dark grayish-brown (10YR 3/1 to 3/2) when moist, friable silty clay loam with moderate fine to medium granular structure.

A_3 9 to 16 inches
Grayish-brown to dark grayish-brown (10YR 4/2 to 3/2) when moist, silty clay loam with weak fine to medium blocky structure.

B_1 16 to 22 inches
Dark yellowish-brown (10YR 4/4) when moist, silty clay loam with weak medium blocky structure.

B_2 22 to 35 inches
Dark yellowish-brown (10YR 4/4) when moist, silty clay loam to silty clay, splotched with brownish yellow (10YR 6/8) and having weak medium to coarse blocky structure.

B_3 35 inches +
Highly mottled gray (10YR 5/1) when moist, to brownish-yellow (10YR 6/6 to 5/6) when moist, silty clay loam; numerous ferromanganiferous concretions.

Shelby silt loam; location, SE¼SW¼, sec. 23, R. 33 W., T. 70 N.:

A_1 0 to 7 inches
Dark grayish-brown (10YR 3/2) when moist, silt loam with moderate medium crumb structure.

A_3 7 to 10 inches
Grayish-brown (10YR 4/2) when moist, silt loam with tongues and splotches of dark yellowish-brown; weak fine blocky structure.

B_1 10 to 18 inches

Dark yellowish-brown (10YR 4/4) when moist, clay loam with some fine and medium-sized glacial rocks and with moderate medium blocky structure.

B_2 18 to 36 inches

Brown (10YR 5/3) when moist, gritty clay to clay loam mottled with low-contrast brownish gray and light yellowish brown; weak medium to coarse blocky structure; mass contains fragments of disintegrated glacial boulders, usually granites or schists.

C 36 inches +

Pale-brown (10YR 6/3) when moist, gritty clay or clay loam mottled with gray, strong brown, and light and dark yellowish brown; disintegrated glacial boulders sometimes present; entire mass occasionally a mixture of sand, gravel, and boulders held together by clay; seams of lime sometimes present.

Wabash silty clay loam; location, SE¼SE¼ sec. 18, T. 70 N., R. 35 W.:

A_{11} 0 to 18 inches

Black (10YR 2/1) when moist, and dark-gray (10YR 4/1) when dry, friable silty clay loam with moderate medium granular structure.

A_{12} 18 to 24 inches

Very dark-gray (10YR 3/1) when moist, to gray (10YR 5/1) when dry, silty clay loam with moderate fine angular block structure.

B_g 24 to 36 inches

Very dark-gray (10YR 3/1) when moist, compact silty clay with weak fine blocky structure; peds arranged in weak prisms.

C_g 36 to 50 inches

Very dark-gray (10YR 3/1) when moist, compact silty clay with massive structure.

Winterset silty clay loam; location, NE corner of SE¼SE¼ sec. 36, T. 68 N., R. 32 W.:

A_1 0 to 16 inches

Very dark-gray to black (10YR 3/1 to 2/1) when moist, friable light silty clay loam having moderate fine to medium granular structure. Grades into—

AB 16 to 22 inches

Very dark-gray (10YR 3/1) when moist, silty clay loam with moderate fine angular blocky structure; material occasionally splotched with brownish yellow. Grades into—

B_{2g} 22 to 40 inches

Dark-gray to gray (10YR 4/1 to 5/1) when moist, heavy silty clay loam, with moderate medium blocky structure toward the base of the horizon, the aggregates being arranged as weak prisms; material heavily mottled with brownish yellow, yellowish brown, and reddish brown. Grades into—

C_g 40 inches +

Pale-brown (10YR 6/3) when moist, friable silty clay loam heavily mottled with gray, yellowish brown, and reddish brown; massive structure; material grades into neutral leached loess of silt loam texture at depth of about 60 inches.

GENERAL FEATURES OF TAYLOR COUNTY

CLIMATE

Climatic data at Bedford are given in table 9. The average length of the frost-free season is 160 days, or from May 2 to October 9. This season is usually ample for maturing field crops. Occasionally, late wet springs delay planting so that early fall frosts injure the corn before it has matured.

TABLE 9.—*Normal monthly, seasonal, and annual temperature and precipitation at Bedford, Taylor County, Iowa*

[Elevation, 1,215 feet]

Month	Mean temperature	Precipitation		
		Mean	Total for the driest year	Total for the wettest year
	° *F.*	*Inches*	*Inches*	*Inches*
December	26. 8	1. 05	0. 32	2. 13
January	23. 3	1. 00	2. 46	. 95
February	26. 5	1. 20	. 36	. 50
Winter	25. 5	3. 25	3. 14	3. 58
March	38. 7	1. 61	. 05	. 90
April	51. 0	2. 74	1. 01	1. 50
May	61. 5	4. 14	4. 17	5. 13
Spring	50. 4	8. 49	5. 23	7. 53
June	71. 2	5. 10	1. 19	10. 62
July	76. 5	3. 74	1. 35	7. 63
August	74. 1	4. 10	1. 76	7. 38
Summer	73. 9	12. 94	4. 30	25. 63
September	67. 5	4. 12	4. 09	4. 76
October	54. 8	2. 70	1. 37	2. 95
November	39. 7	1. 87	. 35	2. 10
Fall	54. 0	8. 69	5. 81	9. 81
Year	51. 0	33. 37	[1] 18. 48	[2] 46. 55

[1] In 1910. [2] In 1902.

TRANSPORTATION

A paved road passes through the south-central part of the county from east to west; and a hard-surfaced road passes through the center from south to north. Several graveled county highways provide all-weather outlets. A branch line of the Chicago, Burlington & Quincy Railroad from Creston, Iowa, to St. Joseph, Mo., services the towns of Lenox, Merle, Conway, and Bedford; and another branch line extends from Merle to Clearfield. In the southeastern part of the county the Great Western Railway serves Blockton and Athelstan.

SETTLEMENT

The establishment of Taylor County was provided for by an act of the Iowa General Assembly on February 24, 1847. In January 1851 the assembly passed the act that defined the county. The county is bordered on the south by the State of Missouri and on the other three sides by the Iowa counties of Page, Adams, and Ringgold. The total area of the county is 534 square miles, or 341,760 acres.

When the county was established in 1851, the population was 204. It increased to 6,989 in 1870, and then to a high of 18,784 in 1900. With the adoption of better farming methods and the introduction of new farm machines, the size of farms has gradually increased and the population has subsequently decreased. In 1950 the population was 12,420. Most of the inhabitants are engaged in agriculture. Industries are minor and employ relatively few people.

AGRICULTURE

The total area in farms in Taylor County in 1950 was 334,355 acres. Cropland harvested covered 176,526 acres; plowable pasture, 35,666; woodland, 16,323; and all other land, such as nonplowable pasture, towns, and roads, 105,840. The average size of farms in the county increased from about 150 acres in 1920 to 161 in 1950.

About three-fourths of the farms derive most of their income from livestock and livestock products.

The number of livestock in the county in stated years is given in table 10. In 1950, the 2,032 farms in the county were classified, based on major source of income, by type, as follows:

Type of farm:	*Number*
Livestock	1,408
General (no one source producing more than half the income)	198
Miscellaneous and unclassified	189
Cash grain	144
Poultry	28
Dairy	60
No products reported sold or used	5

TABLE 10.—*Number of livestock on farms in Taylor County, Iowa, in stated years*

Livestock	1920	1930	1940	1950
	Number	*Number*	*Number*	*Number*
Swine	69, 740	91, 467	[1] 44, 445	90, 151
Cattle	34, 989	35, 455	[2] 34, 854	44, 167
Sheep	24, 363	27, 184	[3] 19, 856	11, 859
Horses and mules	15, 371	11, 124	[2] 8, 254	3, 468
Chickens	282, 875	[2] 281, 276	[1] 231, 836	223, 435

[1] Over 4 months old, Apr. 1.
[2] Over 3 months old, Apr. 1.
[3] Over 6 months old, Apr. 1.

Corn is the principal grain crop, but oats also are important. The acreage in corn was 80,612 in 1949, considerably less than the high of 115,095 acres in 1880. This decrease is due to erosion of steep land, which has forced some areas out of corn production; to longer rotations to control erosion and obtain better yields; and to increased emphasis on livestock farming. The acreages of the major crops and number of fruit trees and grapevines are given in table 11.

TABLE 11.—*Acreage of the major crops and number of fruit trees and grapevines in Taylor County, Iowa, in stated years*

Crop	1919	1929	1939	1949
	Acres	*Acres*	*Acres*	*Acres*
Corn for grain	83, 250	86, 039	76, 079	80, 612
Oats threshed	30, 919	26, 796	31, 903	37, 978
Wheat	33, 321	7, 169	9, 528	12, 416
Barley	447	1, 961	166	55
Soybeans	([1])	606	2, 084	3, 476
Sorghums for grain and forage	[2] 454	21	1, 931	236
All hay	22, 967	42, 684	30, 312	34, 094
Annual legumes	72	169	7, 259	371
Timothy and clover alone or mixed	19, 813	38, 195	14, 548	22, 768
Alfalfa	869	3, 076	4, 892	6, 881
Lespedeza	([2])	([2])	451	1, 572
Other tame hay	865	671	349	674
Wild hay	890	203	297	122
Grains cut green	458	367	2, 516	1, 706
	Number	*Number*	*Number*	*Number*
Peaches trees	2, 872	5, 887	6, 840	10, 544
Apples do	26, 370	9, 701	5, 738	4, 644
Cherries do	2, 263	2, 758	1, 823	827
Grapevines	7, 574	10, 551	3, 194	4, 776

[1] Not reported.
[2] Includes kafir for forage.

LITERATURE CITED

(1) HUTTON, C. E.
1947. STUDIES OF LOESS-DERIVED SOILS IN SOUTHWESTERN IOWA. Soil Sci. Soc. Amer. Proc. 12: 424–431, illus.

(2) ———
1947. THE MORPHOLOGY AND GENESIS OF PRAIRIE SOILS DEVELOPED FROM PEORIAN LOESS IN SOUTHWESTERN IOWA. [Doctor's thesis, Iowa State College.]

(3) KAY, G. F., and GRAHAM, J. B.
1943. THE ILLINOIAN AND POST-ILLINOIAN PLEISTOCENE GEOLOGY OF IOWA. Iowa Geol. Survey Ann. Rpt. (1940–41) 38: 262, illus.

(4) MARBUT, C. F.
1935. SOILS OF THE UNITED STATES. U. S. Dept. Agr. Atlas of American Agriculture, pt. 3, 98 pp., illus.

(5) MIDDLETON, H. E., SLATER, C. S., and BYERS, H. G.
1934. THE PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE SOILS FROM THE EROSION EXPERIMENT STATIONS—SECOND REPORT. U. S. Dept. Agr. Tech. Bul. 430, 63 pp., illus.

(6) SIMONSON, R. W., RIECKEN, F. F., AND SMITH, GUY D.
1952. UNDERSTANDING IOWA SOILS. 142 pp., illus. Dubuque, Iowa.

(7) SMITH, GUY D.
1942. ILLINOIS LOESS. Bul. 490, Univ. of Ill., Urbana, Ill.

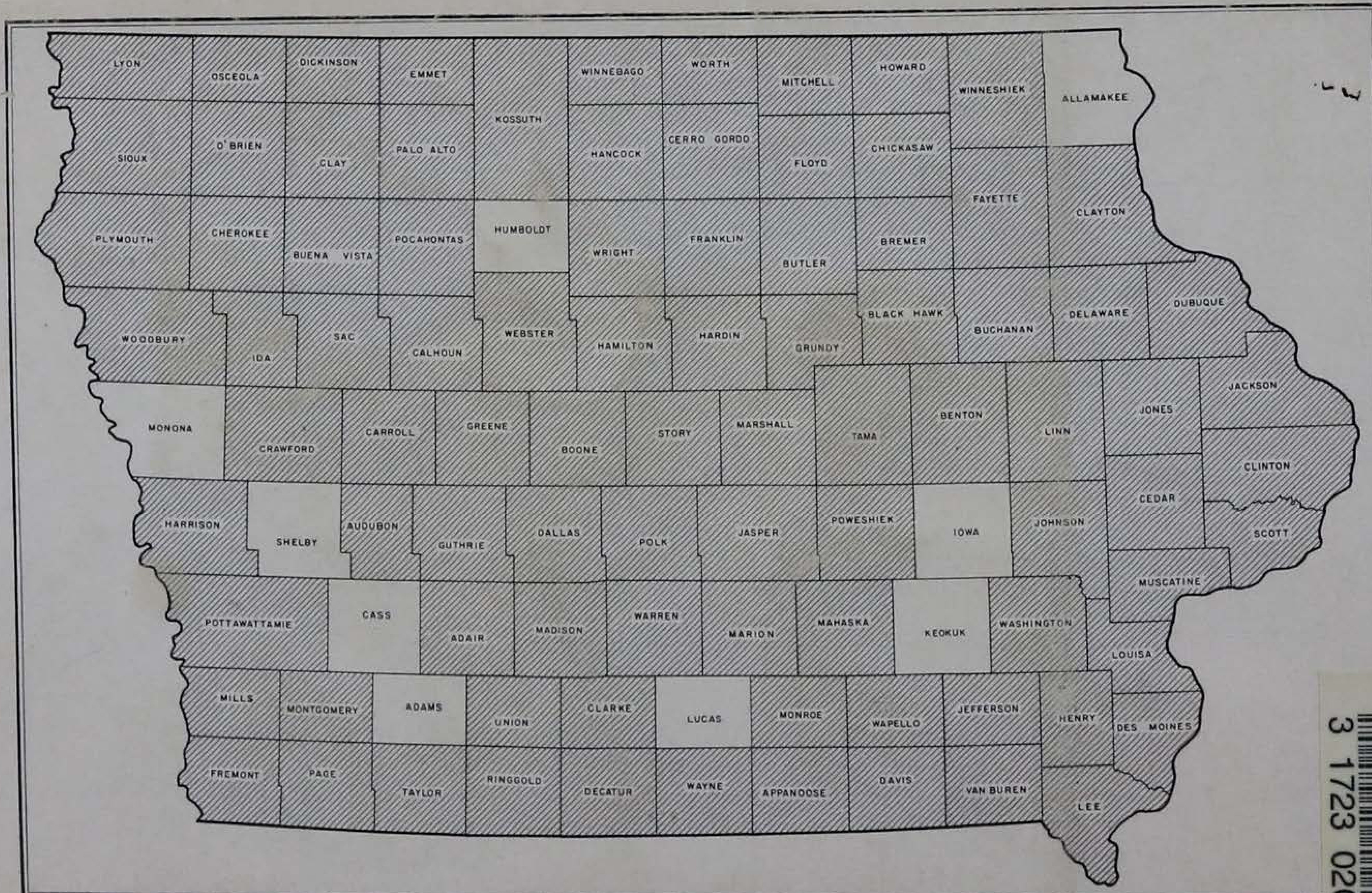
(8) SMITH, H. W., and RHOADES, H. P.
1945. PHYSICAL AND CHEMICAL PROPERTIES OF SOIL PROFILES OF THE BURCHARD AND STEINAUER SERIES. Nebr. Agr. Expt. Sta. Res. Bul. 139, 41 pp., illus.

(9) ULRICH, RUDOLPH.
1949. SOME PHYSICAL AND CHEMICAL PROPERTIES OF PLANOSOL AND WIESENBODEN SOIL SERIES AS RELATED TO LOESS THICKNESS AND DISTRIBUTION. [Doctor's thesis, Iowa State College.]

(10) WILSON, H. A., RIECKEN, F. F., and BROWNING, G. M.
1946. SOIL PROFILE CHARACTERISTSICS IN RELATION TO DRAINAGE AND LEVEL TERRACES. Soil Sci. Soc. Amer. Proc. 11: 110–118, illus.

U. S. GOVERNMENT PRINTING OFFICE: 1954

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C.



Areas surveyed in Iowa shown by shading.