SOIL SURVEY

Allamakee County Iowa

Series 1939, No. 29

Issued August 1958

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with the
IOWA AGRICULTURAL EXPERIMENT STATION

How to Use THE SOIL SURVEY REPORT

THIS REPORT is about the soils of Allamakee County, Iowa. It describes each kind of soil in the county and tells how you can use it, how to take care of it, and what yields you can expect. The soil map shows the location and extent of each kind of soil. Field work for this survey was completed in 1949, and, unless otherwise specifically mentioned, all statements in the report refer to conditions in the county at that time.

SOILS OF A FARM

If you are a farmer or if you work with farmers, you probably want to know about the soils of a farm or small tract. First, find the right place on the soil map. The map shows township and section lines, towns and villages, roads, and streams, most of the houses in rural areas, and other landmarks. Remember that 2 inches on the map is 1 mile on the ground.

Each kind of soil is marked on the map by a symbol made up of two letters; for example, the symbol FA identifies Fayette silt loam, 4 to 7 percent slopes. On the margin of one of the map sheets are printed the names of all the soils mapped in the county, the symbols that identify them, and the color in which each is shown on the map. Look up the symbols in the map legend, to find the names of your soils. Then you can refer to the soil description in the report.

Suggestions for managing each soil are contained in the section Soil Management. Yields that you can expect from common crops are shown in table 2.

SOILS OF THE COUNTY AS A WHOLE

A general idea of the soils of the county is given in table 1 in the section How Allamakee Soils Differ. 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 will want to read Additional Facts About Allamakee 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 Formation and Classification of Allamakee County Soils.

Soil Survey Series 1939, No. 29 Issued August 1958

SOIL SURVEY OF ALLAMAKEE COUNTY, IOWA[1]

By W. H. SCHOLTES and G. A. SWENSON, in Charge, and C. A. MOGEN and K. K. KITTLESON, Soil Survey, U. S. Department of Agriculture, and J. E. LEGVOLD and D. F. MOINE, Iowa Agricultural Experiment Station

Area inspected by GUY D. SMITH, Principal Soil Correlator, Soil Survey, and F. F. RIECKEN, Professor of Soils, Iowa State College of Agriculture and Mechanic Arts

United States Department of Agriculture in cooperation with the Iowa Agricultural Experiment Station

CONTENTS

[1] Field work for this study was done when Soil Survey was a part of the Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration. Soil Survey was transferred to the Soil Conservation Service on Nov. 15, 1952.

HOW ALLAMAKEE SOILS DIFFER

A TOTAL OF 42 soils and miscellaneous land types is mapped and described for Allamakee County. Each requires different management if it is to produce the best yields now and in the future. The major characteristics of each soil that affect its use and management are shown in table 1. Other characteristics influencing agricultural use are mentioned in the section Soil Types and Phases, where each unit shown on the soil map is described in detail.

Differences in soils are easier to remember if their position on the landscape can be visualized in the manner shown in figure 1. This schematic drawing shows several important soils of the county as they occur in a typical upland area; the parent material, slope, and native vegetation; and the kinds of profiles that have developed.

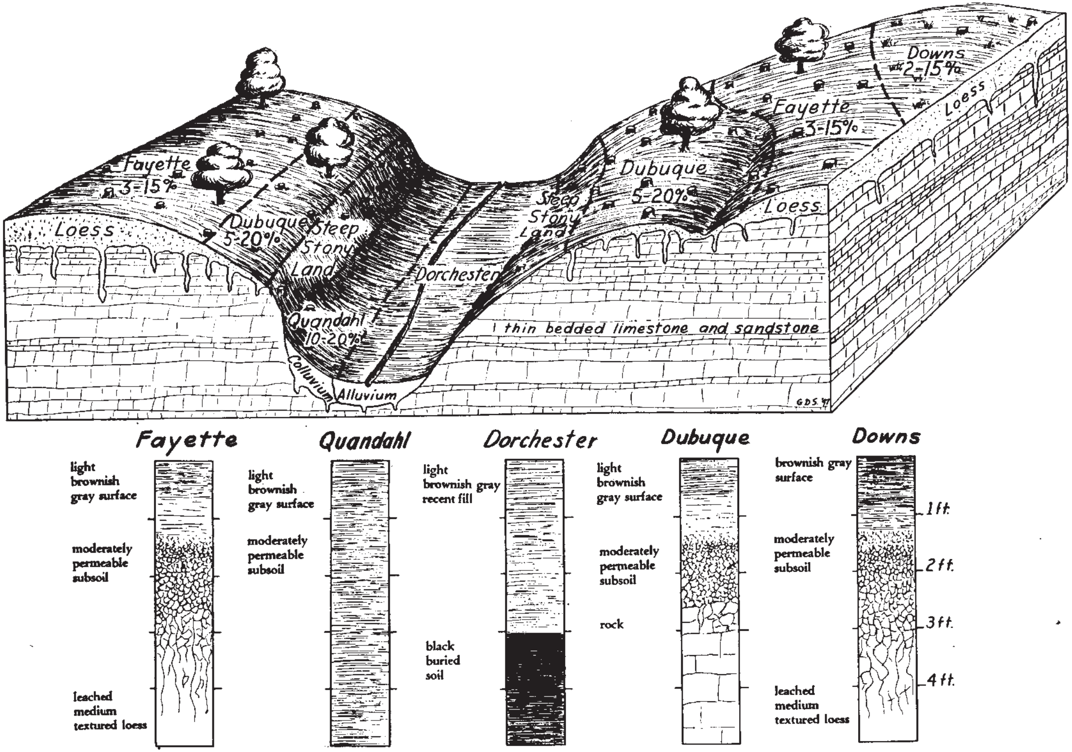


Figure 1.—Some important soils of Allamakee County as they occur on a typical upland landscape. Clumps of grass indicate original prairie vegetation, and the tree stumps mean timber. Horizontal shading in profile diagrams indicates amount of organic matter, and the rounded, blocklike, or elongated outlining shows the shape and relative size of the soil fragments.

TABLE 1.—*Summary of major features of Allamakee County, Iowa, soils*

Map symbol	Soil	Thickness of surface layer	Thickness of soil	Organic-matter content	Permeability of subsoil [1]	Degree and kind of erosion [2]	Drought resistance
		Inches	*Feet*				
AL	Alvin sandy loam, 1 to 2 percent slopes.	4–6	3–5	Low	Very rapid	None	Poor.
BA	Buckner loamy sand, 1 to 6 percent slopes.	8–12	3–10	Medium	Very rapid	Moderate, wind	Poor.
BB	Buckner loamy sand, 7 to 12 percent slopes.	8–12	3–10	Medium	Very rapid	Moderate, wind and water.	Poor.
BC	Buckner loamy sand, 13 to 16 percent slopes.	4–10	3–10	Medium	Very rapid	Severe, wind and water.	Poor.
CJ	Chaseburg and Judson silt loams, 1 to 2 percent slopes.	10–20	3–10	Medium	Moderate	Moderate, gully	Good.
CR	Chelsea loamy fine sand, 1 to 6 percent slopes.	1–2	3–10	Very low	Very rapid	Moderate, wind	Poor.
CS	Chelsea loamy fine sand, 7 to 12 percent slopes.	1–2	3–10	Very low	Very rapid	Moderate, wind and water.	Poor.
CT	Chelsea loamy fine sand, 13 to 25 percent slopes.	1–2	3–10	Very low	Very rapid	Severe, wind and water.	Poor.
DA	Dodgeville silt loam, eroded, 10 to 16 percent slopes.	3–8	1.5–3	Low	Moderate	Very severe, sheet	Fair.
DC	Dorchester silt loam, 0 to 1 percent slopes.	(3)	3–10	Medium	Moderate	None	Good.
DD	Dorchester silt loam, overflow phase, 0 to 1 percent slopes.	(3)	3–10	Medium	Moderate	None	Good.
DK	Downs and Tama silt loams, 4 to 7 percent slopes.	8–10	3–10	Medium high	Moderate	Moderate, sheet	Good.
DL	Downs and Tama silt loams, eroded, 8 to 12 percent slopes.	4–8	3–10	Medium low	Moderate	Severe, sheet	Good.
DM	Downs and Tama silt loams, bench position, 1 to 4 percent slopes.	10–14	3–10	High	Moderate	Slight, sheet	Good.

DN	Downs and Tama silt loams, bench position, 5 to 7 percent slopes.	8–10	3–10	Medium high	Moderate	Moderate, sheet	Good.
DO	Downs and Tama silt loams, bench position, eroded, 8 to 12 percent slopes.	4–8	3–10	Medium low	Moderate	Severe, sheet	Good.
DU	Dubuque silt loam, 4 to 8 percent slopes.	4– 8	1– 3	Low	Moderate	Severe, sheet	Fair to good.
DV	Dubuque silt loam, eroded, 10 to 16 percent slopes.	2– 6	1– 3	Very low	Moderate	Very severe, sheet	Fair.
FA	Fayette silt loam, 4 to 7 percent slopes.	4– 6	3–10	Low	Moderate	Moderate, sheet	Good.
FB	Fayette silt loam, eroded, 8 to 14 percent slopes.	2– 6	3–10	Very low	Moderate	Severe, sheet	Good.
FC	Fayette silt loam, bench position, 1 to 4 percent slopes.	4– 6	3–10	Low	Moderate	Slight, sheet	Good.
FD	Fayette silt loam, bench position, 5 to 7 percent slopes.	4– 6	3–10	Low	Moderate	Moderate, sheet	Good.
FE	Fayette silt loam, bench position, eroded, 8 to 14 percent slopes.	2– 6	3–10	Very low	Moderate	Severe, sheet	Good.
JU	Judson silt loam, 1 to 6 percent slopes.	15–25	3–10	High	Moderate	Slight, sheet	Good.
JV	Judson silt loam, 7 to 12 percent slopes.	15–20	3–10	Medium high	Moderate	Moderate, sheet	Good.
MA	Mixed alluvium, 2 to 5 percent slopes.	(3)	3–10	Low to medium	Moderate	Moderate, gully	Good.
QA	Quandahl silt loam, 7 to 12 percent slopes.	2– 6	2–10	Low	Moderate	Moderate, sheet	Fair to good.
QB	Quandahl silt loam, 13 to 16 percent slopes.	2– 6	2–10	Low	Moderate	Severe, sheet	Fair.
QC	Quandahl silt loam, 17 to 24 percent slopes.	2– 6	2–10	Low	Moderate	Very severe, sheet	Fair.
SA	Sandy escarpment, 18 to 30 percent slopes.	0– 2	3–10	Very low	Very rapid	Very severe, sheet	Poor.
SB	Silty escarpment, 15 to 25 percent slopes.	0– 2	2–10	Very low	Rapid	Very severe, sheet	Fair.
SH	Schapville silt loam, 4 to 7 percent slopes.	4– 6	3–10	Medium high	Slow	Moderate, sheet	Good to fair.
SO	Sogn silt loam, 4 to 7 percent slopes	4– 8	1	Low	Moderate	Moderate, sheet	Poor.

See footnotes at end of table.

TABLE 1.—*Summary of major features of Allamakee County, Iowa, soils*—Continued

Map symbol	Soil	Thickness of surface layer	Thickness of soil	Organic-matter content	Permeability of subsoil [1]	Degree and kind of erosion [2]	Drought resistance
		Inches	*Feet*				
SR	Steep rocky land, 18 to 30 percent slopes.	0– 4	0– 3	Low	Slow to rapid	Very severe, sheet	Poor.
ST	Steep rocky land, 30 to 60 percent slopes.	0– 2	0– 3	Very low	Slow to rapid	Very severe, sheet	Poor.
TA	Tama silt loam, 4 to 7 percent slopes	8–12	3–10	Medium high	Moderate	Moderate, sheet	Good.
TB	Tama silt loam, eroded, 8 to 12 percent slopes.	4–10	3–10	Medium	Moderate	Severe, sheet	Good.
TC	Tama silt loam, bench position, 1 to 4 percent slopes.	10–14	3–10	High	Moderate	Slight, sheet	Good.
TD	Tama silt loam, bench position, 5 to 7 percent slopes.	8–12	3–10	Medium high	Moderate	Moderate, sheet	Good.
VO	Volney loam, 2 to 6 percent slopes	6–15	3–10	Medium	Moderate	Slight, gully	Good.
WA	Waukegan loam, shallow phase, 1 to 3 percent slopes.	5–10	2– 3	Low	Very rapid	None	Poor to fair.
ZW	Zwingle silt loam, 1 to 4 percent slopes.	4– 6	3–10	Low	Very slow	Slight, sheet	Fair.

[1] Permeability refers to the relative rate at which water can move through subsoil and lower layers of the profile. Tama soils, the "ideal" in this respect, have moderate permeability. Very rapid (Buckner) or very slow (Zwingle) permeability classes are much less desirable.

[2] Danger of erosion on land used for cultivated crops without special management for erosion control.

[3] Periodic flooding adds new material, usually silt loam in texture.

It is also helpful if one keeps in mind the location of the principal soil series within the county. Their general distribution is shown in figure 2, and the location of all the soils is shown on the soil map that accompanies this report.

Study the Entire Soil Profile.—Two soils may have similar surface layers, both suitable for growing plants. But the underlying layers of these two soils may be so different that one will produce good crops, and the other, very poor crops. Shallowness to bedrock, clayey or gravelly layers, lack of organic matter, and degree of acidity are some of the important characteristics of soils not apparent at the surface that may affect their suitability for farming.

In considering a soil, it is important to note all of its features to a depth of 40 inches or more. Figure 3 shows the profiles of two good agricultural soils in this county that developed from loess, or windblown material. Comparison of these two profiles shows that the Fayette soil has a thin light-colored surface soil, whereas the Tama has a thick dark-colored surface soil penetrated by many grass roots. As would be expected, the Tama soil is more productive than the Fayette because it has a thick surface layer holding good supplies of nitrogen and organic matter.

Some features important to soil-plant relationships are listed for some of the major soils of the county:

Soil characteristic	*Favorable*	*Less favorable*
Acidity	Judson	Tama, Fayette.
Texture	Tama, Fayette, Downs	Zwingle, Schapville, Chelsea.
Color of surface layer	Tama, Judson	Fayette, Zwingle.
Thickness of surface layer	Tama, Judson	Fayette, Zwingle.
Color of subsoil (poor aeration).	Tama, Fayette, Judson, Downs.	Zwingle, Schapville.
Thickness of soil	Tama, Fayette	Sogn, Dubuque.

The Tama, Judson, and Downs soils have many favorable features, whereas the Fayette has several desirable characteristics but its surface layer is low in organic matter. Corn and alfalfa crops cannot be grown as advantageously on Zwingle, Waukegan, and Buckner soils as on Tama soils. Some soil properties can be corrected—such as by liming to counteract acidity—but little can be done to improve rocky, gravelly, or clayey subsoils.

Consider Erosion and Overflow.—The slope of a soil affects the speed at which water runs off it, the use to which the soil may be put, and the conservation practices that are needed. When a soil is cultivated, the steeper slopes have a greater tendency to erode. For instance, when planted to the same crop and given the same treatment, a Tama silt loam soil with a 9-percent slope will erode about twice as fast as a Tama silt loam with a 5-percent slope.

Different soils have different susceptibility to erosion. Under identical crops and treatments, an area of Schapville silt loam with a 5-percent slope will erode faster than an area of Tama silt loam with a 5-percent slope. This happens because the Schapville soil has a clay subsoil that is slowly permeable to water. When heavy rains come, the Schapville subsoil does not take up moisture fast enough, so more water runs off the surface and takes soil material with it.

Figure 2.—General distribution of the principal soils in Allamakee County.

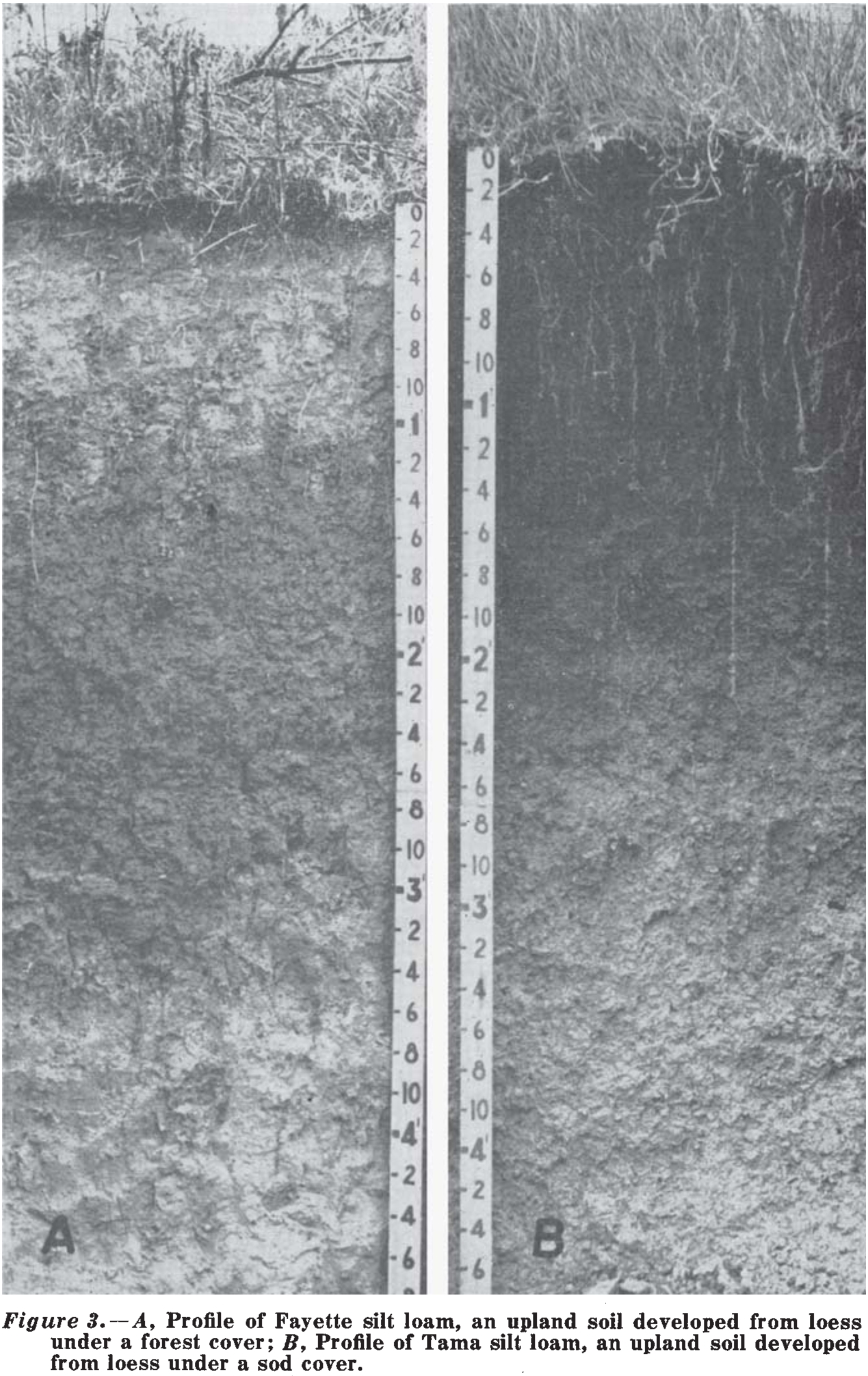


***Figure 3.*—*A*, Profile of Fayette silt loam, an upland soil developed from loess under a forest cover; *B*, Profile of Tama silt loam, an upland soil developed from loess under a sod cover.**

385709—58——2

On bottom lands Dorchester soils or similar soils may receive overflow that drowns out crops after heavy rains. The frequency of flooding on Dorchester and other soils of the bottom lands may vary from field to field, depending upon the dikes, roadbeds, or other natural or man-made features that restrict overflow or cause water to be impounded (fig. 4).

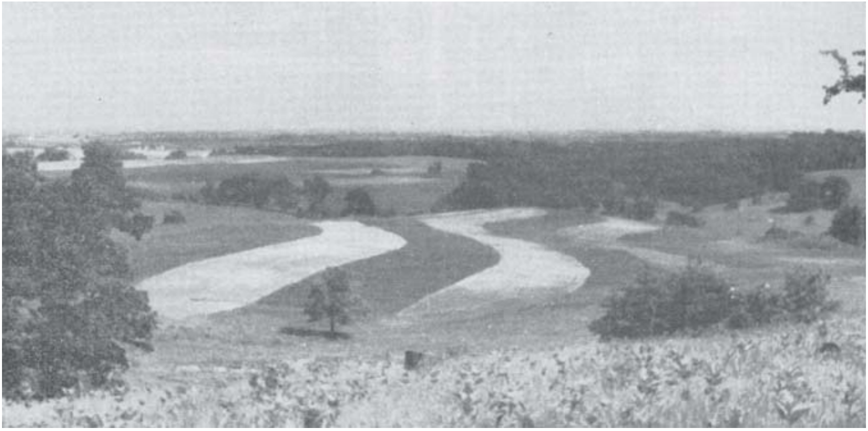


***Figure 4.*—Stripcropping on the sloping soils is a good soil management practice.**

SOIL MANAGEMENT

This report provides most of the information farmers need to know about the soils of Allamakee County. It describes them, shows their location on a colored map, and mentions their strong and weak points. Table 2 lists the soils of the county, the principal management problems, suggested crop rotations, and probable yields of corn, oats, and hay to be expected under ordinary and improved management. Following the table are discussions of some of the important things to be considered in planning the management of a farm.

Soils Vary from Farm to Farm.—The soils on one farm may be quite different from those on a nearby farm. The differences may be so great that entirely different kinds of farming should be practiced. This important fact is illustrated by figure 5, which shows three 160-acre farms in Allamakee County.

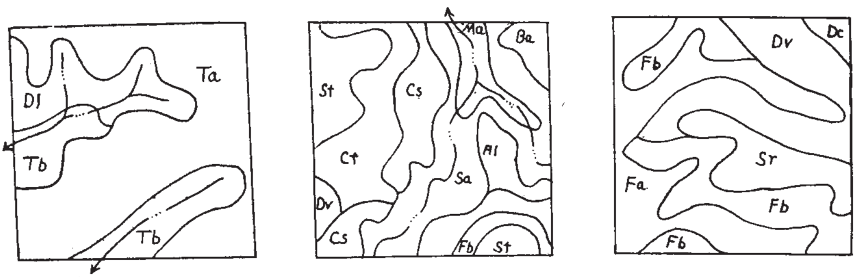


***Figure 5.*—Distribution of soils on three 160-acre farms in Allamakee County. Farm A on left, farm B in center, and farm C on right.**

TABLE 2.—*Principal soil management problems, suitable rotations, and estimated average long-term yields of corn, oats, and hay on the soils of Allamakee County, Iowa*

[Practices used to obtain estimated yields under average management are not shown in this table; they included, in 1948, use of common rotations, such as corn, oats, meadow for Fayette silt loam, 4 to 7 percent slopes; supplying enough lime, some manure, and very little commercial fertilizer; seeding lower than optimum stands of corn; and no use of terracing, contour cultivation, stripcropping, or other special practices for control of erosion. Practices used to obtain estimated yields under good management are shown in this table. Soil tests are made and lime and fertilizer are applied so as to meet the needs shown in the Lime and Fertilizer Requirements column; a rotation or use is selected from the column under Suitable Rotations or Alternative Uses; a suitable combination of supporting practices is followed; and seeding rates suggested by the agricultural experiment station are followed. A. R. Aandahl, Principal Soil Correlator, assisted in the preparation of the crop yield estimates]

Map symbol	Soil	Principal management problems	Lime and fertilizer requirements [1]	Suitable rotations [2] or alternative uses—		Estimated average acre yields under average management			Estimated average acre yields under good soil management		
				Without supporting practices	With supporting practices [3]	Corn	Oats	Hay	Corn	Oats	Hay
						Bu.	*Bu.*	*Tons*	*Bu.*	*Bu.*	*Tons*
AL	Alvin sandy loam, 1 to 2 percent slopes.	Droughtiness	LPK	Corn, oats, and 2 years of meadow; pasture.		36	24	0.4			
BA	Buckner loamy sand, 1 to 6 percent slopes.	Droughtiness, maintenance of fertility, wind erosion.	LPK	Corn, oats, and 4 years of meadow; vegetables; or pasture or woodland.	Corn, oats, and 3 years of meadow.	30	20	.4	45	35	1.0
BB	Buckner loamy sand, 7 to 12 percent slopes.	Droughtiness, maintenance of fertility, wind and water erosion.	LPK	Pasture or woodland	Pasture or woodland	24	18	.3	35	30	1.0
BC	Buckner loamy sand, 13 to 16 percent slopes.	Same	LPK	Pasture or woodland	Pasture or woodland				35	30	1.0
CJ	Chaseburg and Judson silt loams, 1 to 2 percent slopes.	Gully erosion, some excess water.	L	Farm same as adjacent soil.	Farm same as adjacent soil.	58	38	1.2	70	45	2.0
CR	Chelsea loamy fine sand, 1 to 6 percent slopes.	Droughtiness, maintenance of fertility, wind erosion.	LPK	Corn, oats, and 4 years of meadow; or pasture or woodland.	Corn, oats, and 3 years of meadow.	24	18	.3	35	25	.5
CS	Chelsea loamy fine sand, 7 to 12 percent slopes.	Droughtiness, maintenance of fertility, wind and water erosion.	LPK	Pasture or woodland	Pasture or woodland	20	14	.2	25	20	.4
CT	Chelsea loamy fine sand, 13 to 25 percent slopes.	Same	LPK	Pasture or woodland	Pasture or woodland						
DA	Dodgeville silt loam, eroded, 10 to 16 percent slopes.	Very severe sheet erosion.	LPK	Pasture	Corn, oats, and 3 years of meadow.	46	32	.9	50	45	1.8
DC	Dorchester silt loam, 0 to 1 percent slopes.	Flooding, occasional to severe.	(4)	Continuous corn or soybeans.		[5] 30-70			[5] 35-75		
DD	Dorchester silt loam, overflow phase, 0 to 1 percent slopes.	Frequent flooding	(4)	Continuous corn; or pasture or woodland.		[5] 15-30			[5] 20-35		
DK	Downs and Tama silt loams, 4 to 7 percent slopes.	Moderate sheet erosion	LP	Corn, oats, and 2 years of meadow; corn, oats, meadow.	Corn, corn, oats, and 2 years of meadow; corn, corn, oats, meadow; corn, oats, meadow.	60	40	1.3	80	48	2.5

See footnotes at end of table.

TABLE 2.—*Principal soil management problems, suitable rotations, and estimated average long-term yields of corn, oats, and hay on the soils of Allamakee County, Iowa*—Continued

Map symbol	Soil	Principal management problems	Lime and fertilizer requirements [1]	Suitable rotations [2] or alternative uses—		Estimated average acre yields under average management			Estimated average acre yields under good soil management		
				Without supporting practices	With supporting practices [3]	Corn	Oats	Hay	Corn	Oats	Hay
						Bu.	*Bu.*	*Tons*	*Bu.*	*Bu.*	*Tons*
DL	Downs and Tama silt loams, eroded, 8 to 12 percent slopes.	Severe sheet erosion; maintenance of fertility.	LP	Pasture; corn, oats, and 3 years of meadow.	Corn, oats, and 2 years of meadow; corn, oats, meadow.	56	38	1.1	70	45	2.0
DM	Downs and Tama silt loams, bench position, 1 to 4 percent slopes.	None to slight sheet erosion.	LP	Corn, corn, oats meadow; corn, oats, meadow.		62	41	1.4	85	50	2.5
DN	Downs and Tama silt loams, bench position, 5 to 7 percent slopes.	Moderate sheet erosion	LP	Corn, oats, and 2 years of meadow; corn, oats, meadow.	Corn, corn, oats, and 2 years of meadow; corn, corn, oats, meadow; corn, oats, meadow.	60	40	1.3	80	48	2.5
DO	Downs and Tama silt loams, bench position, eroded, 8 to 12 percent slopes.	Severe sheet erosion; maintenance of fertility.	LP	Pasture; corn, oats, and 3 years of meadow.	Corn, oats, meadow; corn, oats, and 2 years of meadow.	56	38	1.1	70	45	2.0
DU	Dubuque silt loam, 4 to 8 percent slopes.	Severe sheet erosion	LPK	Pasture or woodland	Corn, oats, and 2 years of meadow; corn, oats, and 3 years of meadow.	48	34	.8	55	45	1.8
DV	Dubuque silt loam, eroded, 10 to 16 percent slopes.	Very severe sheet erosion	LPK	Pasture or woodland	Corn, oats, and 2 years of meadow; corn, oats, and 3 years of meadow.	42	30	.6	50	40	1.2
FA	Fayette silt loam, 4 to 7 percent slopes.	Moderate sheet erosion	LPK	Corn, oats, and 2 years of meadow.	Corn, corn, oats, and 2 years of meadow; corn, oats (sweetclover); corn, oats, meadow.	54	36	1.0	70	42	2.2
FB	Fayette silt loam, eroded, 8 to 14 percent slopes.	Very severe sheet erosion; low fertility.	LPK	Pasture or woodland	Corn, oats, and 2 years of meadow.	50	34	.8	60	38	1.8
FC	Fayette silt loam, bench position, 1 to 4 percent slopes.	Slight sheet erosion	LPK	Corn, corn, oats, meadow; corn, oats, meadow.		56	37	1.1	75	45	2.4
FD	Fayette silt loam, bench position, 5 to 7 percent, slopes.	Moderate sheet erosion	LPK	Corn, oats, and 2 years of meadow.	Corn, corn, oats, and 2 years of meadow; corn, oats (sweetclover); corn oats, meadow.	54	36	1.0	70	42	2.2
FE	Fayette silt loam, bench position, eroded, 8 to 14 percent slopes.	Very severe sheet erosion; low fertility.	LPK	Pasture or woodland	Corn, oats, and 2 years of meadow.	50	34	.8	60	38	1.8
JU	Judson silt loam, 1 to 6 percent slopes.	Slight sheet erosion; gully erosion in places.	L	Corn, corn, oats, meadow	Corn, corn, oats (sweetclover).	64	43	1.4	85	50	2.4

Jv	Judson silt loam, 7 to 12 percent slopes.	Severe sheet erosion	L	Corn, oats, and 3 years of meadow; pasture.	Corn, oats, and 2 years of meadow.	56	38	1.2	70	45	2.0
Ma	Mixed alluvium, 2 to 5 percent slopes.	Gully erosion	L	Pasture or woodland							
Qa	Quandahl silt loam, 7 to 12 percent slopes.	Severe sheet erosion	LPK	Pasture or woodland	Corn, oats, and 2 years of meadow.	48	32	.8	55	40	1.5
Qb	Quandahl silt loam, 13 to 16 percent slopes.	Very severe sheet erosion.	LPK	Pasture or woodland	Corn, oats, and 3 years of meadow.	42	30	.7	50	35	1.4
Qc	Quandahl silt loam, 17 to 24 percent slopes.	Same	L	Pasture or woodland		38	26	.5	42	30	1.2
Sa	Sandy escarpment, 18 to 30 percent slopes.	Very severe gully erosion.		Ungrazed permanent cover; woodland.							
Sh	Schapville silt loam, 4 to 7 percent slopes.	Poor internal drainage	LPK	Corn, oats, and 3 years of meadow; hay; pasture.	Farm same as adjacent soil.	40	30	.7	45	35	2.0
Sb	Silty escarpment, 15 to 25 percent slopes.	Very severe gully erosion.		Ungrazed permanent cover; woodland.							
So	Sogn silt loam, 4 to 7 percent slopes.	Droughtiness, shallow soil.		Pasture or woodland							
Sr	Steep rocky land, 18 to 30 percent slopes.	Droughtiness, shallow soil.		Pasture or woodland							
St	Steep rocky land, 30 to 60 percent slopes.	Droughtiness, shallow soil.		Pasture or woodland							
Ta	Tama silt loam, 4 to 7 percent slopes.	Moderate sheet erosion	LPK	Corn, oats, and 2 years of meadow; general crops.	Corn, corn, oats, and 2 years of meadow; corn, corn, oats, meadow.	62	42	1.3	82	50	2.5
Tb	Tama silt loam, eroded, 8 to 12 percent slopes.	Severe sheet erosion; low fertility.	LPK	Corn, oats, and 3 years of meadow.	Corn, corn, oats, and 3 years of meadow.	58	40	1.1	72	47	2.2
Tc	Tama silt loam, bench position, 1 to 4 percent slopes.	None to slight sheet erosion.	LPK	Corn, corn, oats, meadow; corn, oats, meadow.		64	43	1.4	88	52	2.5
Td	Tama silt loam, bench position, 5 to 7 percent slopes.	Moderate sheet erosion	LPK	Corn, oats, and 2 years of meadow.	Corn, corn, oats, and 2 years of meadow.	62	42	1.3	82	50	2.5
Vo	Volney loam, 2 to 6 percent slopes.	Gully erosion; flooding	PK	Corn, corn, oats, meadow; pasture or woodland.							
Wa	Waukegan loam, shallow phase, 1 to 3 percent slopes.	Droughtiness	LPK	Corn, oats, and 2 years of meadow; pasture; hay; rye.		34	22	.3	45	35	1.5
Zw	Zwingle silt loam, 1 to 4 percent slopes.	Internal and surface drainage.	LPK	Corn, corn, oats, meadow; hay; pasture; woodland.		38	26	.5	45	30	1.5

[1] L=lime; P=phosphorus; K=potassium. Fertilizers often give a crop response, but soil tests should be made.

[2] In suggesting these rotations it is assumed that (1) maximum corn production is the goal or choice; (2) long-time, moderately high yields are desired, (3) each soil area is physically accessible; and (4) soil losses by erosion will be reduced to a small amount.

[3] Supporting practices on cropland are chosen in relation to soil characteristics, especially slope, and the crop rotation. They may include contour cultivation, contour strip-cropping, terracing, and use of windbreaks.

[4] Use soil tests to determine fertility status; flooding is a risk if fertilizer is used.

[5] Flood hazard is highly variable among different areas of this soil.

Farm A consists mainly of gently sloping Tama soils (TA); farm B, chiefly Chelsea soils (Cs, Ct) and Steep rocky land (St); and farm C, mostly the moderately sloping Fayette (FA, FB) and Dubuque (Dv) soils.

Farm A is well suited to corn, oats, and hay because it consists mostly of the nearly level Tama soils. Corn yields on the Tama soils may be 60 to 80 bushels an acre under the kind of management ordinarily practiced in the county. Possibly the yield will be 80 to 100 bushels if a corn, corn, oats, hay rotation is followed; proper kinds and amounts of fertilizer are applied; and adequate planting rates are used.

Farm B can be expected to produce only poor crops of corn, oats, and hay, even if fertilizers are properly used and good crop rotations are followed. Chelsea soils (Cs, Cf) and Steep rocky land (St) dominate on the farm. The Chelsea soils are extremely droughty and will produce only fair to poor crops or pasture. The Steep rocky land produces poor pasture and is only fair for timber. The agricultural possibilities of farm B are severely limited because the soils are low in fertility, droughty, or steep and stony.

Farm C, mostly moderately sloping Fayette (FA, FB) and Dubuque (Dc, Dv) soils, has good production potential for corn, oats, and hay but it needs more intensive management than farm A. On the easily eroded rolling Fayette soils corn yields of 50 to 60 bushels an acre can be reached by using a rotation of corn, oats, and 2 years of meadow, provided the soils are cultivated on the contour and adequate fertilizer is applied. The Dubuque soils, only 2 to 3 feet thick over limestone bedrock, must be protected from erosion and should be used only for pasture and hay. Possibly corn can be planted once every 4 to 5 years if the stand of pasture or hay plants has become sparse and needs reseeding.

To improve and conserve the soils on a farm, each area or field should be examined for erodibility and drainage requirements. Need for lime and fertilizer should be checked by soil tests. Then, the combination of practices best suited to the needs and capabilities of the soils should be selected. Selection of the right plan of management requires consideration of the practices discussed in the following pages.

Use Soil Tests to Assess Fertility Status.—The soils of Allamakee County frequently do not have enough nitrogen, phosphorus, and potassium to produce the best yields. Many soils need lime to correct acidity. The degree of deficiency can be learned by making soil tests. Your County Extension Director or local representative of the Soil Conservation Service can tell you how to take soil samples and where to send them for testing. After the tests have been made, you have a basis for planning sound use of commercial fertilizer, manure, green-manure crops, and crop residues. You also need to consider the fertility requirements of the various crops.

Soil Moisture Supply.—Plants will not make good growth if the soil holds too little water to carry them through dry weather. The more important soils of the county can be rated as follows:

Soil series:	*Drought hazard*
Downs, Tama, Fayette, Judson, Dorchester, Chaseburg, Volney.	Slight to none.
Dubuque, Dodgeville, Quandahl, Schapville, Zwingle, Waukegan.	Moderate.
Chelsea, Buckner, Alvin	Serious.

The Zwingle and Schapville soils hold too much moisture in spring and may be droughty later in the season. These soils have poor drainage because of their tight, slowly permeable subsoil. They can be improved somewhat by surface drains. If drainage cannot be improved economically, plants more tolerant of wetness than corn or alfalfa should be used.

Erosion.—Most of the soils in this county used for crops are moderately to strongly sloping. If corn or other intertilled crops are grown on these soils too often without enough care, sheet and gully erosion become serious. Sheet erosion gradually removes the surface soil, and with it the nitrogen and phosphorus held in the organic matter as well as the nutrients added as fertilizer.

Gully erosion reduces the amount of cropland, cuts up fields, and increases operating costs. The farmer has a choice of filling in the gullies or attempting to work around them. Breakage of machinery will increase if the gullies are left, and costs of filling them are high.

Erosion is more serious on some soils than on others. Tama and Downs soils have much nitrogen and phosphorus in the organic form, whereas the Fayette soils have only a small amount. Thus, when Tama and Downs soils are eroded, they lose more phosphorus and nitrogen than the Fayette. Erosion also removes the plant nutrients that were added by growing legumes or by applying commercial fertilizer or manure. All the nutrient value added by legumes, fertilizer, or manure is not used the first year. The benefit carries over to following crops if the surface layer is not damaged by erosion.

Erosion is most serious on Dubuque and Dodgeville soils, which are shallow to limestone bedrock and usually 20 to 30 inches deep. Any loss of soil material decreases moisture-holding capacity. The shallow Dubuque and Dodgeville soils must be protected from erosion if they are to remain productive. Because they are so easily eroded, it is best to keep them in meadow crops most of the time.

Wind erosion is serious on the sandy Chelsea and Buckner soils. If large fields of these soils are cultivated, the wind picks up the soil material and leaves large shallow depressions, or blowouts. The sand may settle on adjacent productive land and reduce its usefulness. Sandy soils should be planted to rye or to grasses.

Erosion can be controlled by planting crops on the contour, stripcropping, terracing, establishing sodded drainageways, and by use of crop rotations that include grass-legume meadows. Your local representative of the Soil Conservation Service or your County Extension Service Director will help you work out a plan for controlling erosion and making good use of the soils on your farm.

Capability

Capability classes are practical groupings of soils that show their relative long-term suitability for tilled crops, forage, forestry, wildlife, watersheds, or recreation. Table 3 carries a column that gives capability of each soil.

Eight broad groups of soils are provided in the nationwide capability system. Each soil of Allamakee County falls in one of these broad groups.

Soils that have no serious limitations for use are in class I. Such soils are not subject to erosion, serious drought, or wetness, or other limitations. The farmer can use safely his class I soils for the common crops of the region without special practices to avoid deterioration of the soils. He can choose one of several cropping patterns; or if he wishes, he may use the soil for forage, trees, or for other purposes.

Soils are in class II if they are a little less widely adaptable than those in class I. For example, a gently sloping soil may have a slight erosion hazard and require contour farming or some other practice for control. Other soils may be in class II because they are too droughty, too wet, or too shallow.

Class III soils are suitable for regular cropping but they have more narrow adaptations for use or more stringent management requirements than class II soils. The soils that have narrower crop adaptations than class III soils but are still suitable for tillage part of the time, or with special precautions, are in class IV.

Soils on which cultivation is not advisable are in classes V, VI, VII, or VIII. Class V consists only of those soils not subject to erosion but of limited suitability for cultivation because of frequency of overflow. Class VI contains soils that may be steep, droughty, or shallow but may produce fairly good amounts of forage, orchard, or forest products. As a rule class VI soils should not be cultivated; but some of them can be tilled safely to prepare for planting trees or long-time seedings of forage crops.

Soils in class VII have more limited uses than those in class VI and usually give only fair to poor yields of forage or wood products. Class VIII (none in Allamakee County) consists of soils so severely limited that they produce little useful vegetation. They may make up attractive scenery or may be parts of useful watersheds. Some may have value for wildlife habitats.

SUBCLASSES: Within a single capability class, the kinds of problems may differ greatly. These problems and limitations may result from erosion (designated by the symbol e), excess water (w), shallowness or low capacity for available moisture (s). The symbol indicating kind of use limitation is added to the capability-class symbol to give more specific information on the reason for placing a soil in a given class. Though the capability subclass symbol gives more information about the soil than the capability class, the farmer should recognize that subclasses vary greatly from region to region, or even within a county, in economic value, in crop adaptation, and in productivity.

TABLE 3.—*Approximate acreage and proportionate extent and capability classification for soils of Allamakee County, Iowa*

Soil	Area	Extent	Capability class [1]
	Acres	*Percent*	
Alvin sandy loam, 1 to 2 percent slopes	46	(2)	IIIs
Buckner loamy sand, 1 to 6 percent slopes	1, 179	0. 3	IIIs
Buckner loamy sand, 7 to 12 percent slopes	760	. 2	IVs
Buckner loamy sand, 13 to 16 percent slopes	304	. 1	VIs
Chaseburg and Judson silt loams, 1 to 2 percent slopes	3, 860	. 9	IIw or IIe
Chelsea loamy fine sand, 1 to 6 percent slopes	114	. 1	IVs

See footnotes at end of table.

TABLE 3.—*Approximate acreage and proportionate extent and capability classification for soils of Allamakee County, Iowa*—Continued

Soil	Area	Extent	Capability class [1]
	Acres	*Percent*	
Chelsea loamy fine sand, 7 to 12 percent slopes	258	0. 1	VIs
Chelsea loamy fine sand, 13 to 25 percent slopes	538	. 1	VIIs
Dodgeville silt loam, eroded, 10 to 16 percent slopes	276	(2)	IVe
Dorchester silt loam, 0 to 1 percent slopes	17, 794	4. 4	I or IIw
Dorchester silt loam, overflow phase, 0 to 1 percent slopes	12, 727	3. 1	V
Downs and Tama silt loams, 4 to 7 percent slopes	19, 332	4. 7	IIIe
Downs and Tama silt loams, eroded, 8 to 12 percent slopes	11, 946	2. 9	IVe
Downs and Tama silt loams, bench position, 1 to 4 percent slopes	814	. 2	IIe
Downs and Tama silt loams, bench position, 5 to 7 percent slopes	100	(2)	IIIe
Downs and Tama silt loams, bench position, eroded, 8 to 12 percent slopes	18	(2)	IVe
Dubuque silt loam, 4 to 8 percent slopes	1, 082	. 3	IIIe
Dubuque silt loam, eroded, 10 to 16 percent slopes	31, 173	7. 6	IVe
Fayette silt loam, 4 to 7 percent slopes	52, 543	12. 9	IIIe
Fayette silt loam, eroded, 8 to 14 percent slopes	104, 216	25. 5	IIIe
Fayette silt loam, bench position, 1 to 4 percent slopes	529	. 1	IIe
Fayette silt loam, bench position, 5 to 7 percent slopes	95	(2)	IIIe
Fayette silt loam, bench position, eroded, 8 to 14 percent slopes	65	(2)	IVe
Judson silt loam, 1 to 6 percent slopes	507	. 1	IIe
Judson silt loam, 7 to 12 percent slopes	103	(2)	IIIe
Mixed alluvium, 2 to 5 percent slopes	10, 946	2. 7	IIIe
Quandahl silt loam, 7 to 12 percent slopes	803	. 2	IIIe
Quandahl silt loam, 13 to 16 percent slopes	2, 806	. 7	IVe
Quandahl silt loam, 17 to 24 percent slopes	4, 984	1. 2	VIe
Sandy escarpment, 18 to 30 percent slopes	1, 725	. 4	VIIs
Silty escarpment, 15 to 25 percent slopes	1, 578	. 4	VIe
Schapville silt loam, 4 to 7 percent slopes	271	. 1	IIIw
Sogn silt loam, 4 to 7 percent slopes	287	. 1	IVe
Steep rocky land, 18 to 30 percent slopes	40, 897	10. 0	VIIe
Steep rocky land, 30 to 60 percent slopes	66, 368	16. 2	VIIe
Tama silt loam, 4 to 7 percent slopes	746	. 2	IIIe
Tama silt loam, eroded, 8 to 12 percent slopes	463	. 1	IVe
Tama silt loam, bench position, 1 to 4 percent slopes	422	. 1	IIe
Tama silt loam, bench position, 5 to 7 percent slopes	33	(2)	IIIe
Volney loam, 2 to 6 percent slopes	408	. 1	IVs
Waukegan loam, shallow phase, 1 to 3 percent slopes	570	. 1	IIIs
Zwingle silt loam, 1 to 4 percent slopes	349	. 1	IIIw or IVw
Water	14, 925	3. 7	
Total	408, 960	100. 0	

[1] See text for discussion of capability classes and subclasses.
[2] Less than 0.1 percent.

385709—58——3

SOIL TYPES AND PHASES

The soils of Allamakee County are described in the following pages, and their management and use are discussed. Their location is shown on the soil map that accompanies this report, and their approximate acreage, proportionate extent and capability classification are given in table 3.

Table 2, in the section on soil management, gives estimated yields of corn, oats, and hay to be expected on the soils of this county under two levels of management—average and good.

Alvin Soil

Alvin sandy loam, 1 to 2 percent slopes (Al)

This soil occurs on benches along the larger streams in the county. It has formed from waterlain sandy materials. Development took place under a forest cover.

Representative profile:

The surface layer, a grayish-brown sandy loam about 4 inches thick, grades into a pale-brown fine sandy loam layer about 12 inches thick. Below the pale-brown layer and continuing to a depth of about 30 inches is a yellowish-brown sandy clay loam subsoil. Loose sand, gravel, or both lie below the subsoil.

This soil is best used for pasture because it is droughty and subject to wind erosion. A rotation suitable for use without erosion control practices is corn, oats, and meadow for 2 years. Yields of crops are low.

Buckner Soils

The Buckner soils occur mainly on low and high benches along the Upper Iowa and Mississippi Rivers, but in places they extend onto steeper upland slopes that adjoin the sandy stream benches. The Buckner soils are:

Buckner loamy sand, 1 to 6 percent slopes.
Buckner loamy sand, 7 to 12 percent slopes.
Buckner loamy sand, 13 to 16 percent slopes.

These soils lie between the Dorchester soils of the flood bottoms and the Steep rocky lands of the uplands. On the stream benches Buckner soils are associated with the Chelsea soils. The Buckner soils have developed from coarse alluvial sands that have been moved to some extent by winds. Development took place under prairie vegetation.

Representative profile (uneroded soils):

The surface soil is a dark-brown loamy sand about 12 to 18 inches thick. Below the surface layer, the dark yellowish-brown loose loamy sand occasionally contains some gravel.

Variations.—Slopes of the Buckner soils range from 1 percent on the nearly level stream benches to as much as 16 percent on the uplands. The upland slopes usually occur below Steep rocky lands, from which fragments of limestone and sandstone roll down onto the Buckner areas.

Crops on Buckner soils respond to lime, manure, and fertilizer, but these amendments would bring greater returns if applied to soils that are not so droughty. Buckner soils have a low water-holding capacity because they are sandy. They produce poor crops. On sloping areas wind and water erosion are problems.

Buckner loamy sand, 1 to 6 percent slopes (BA)

This soil occurs on benches bordering the larger streams in the county. The profile is similar to the representative profile previously described for all the Buckner soils.

Because of droughtiness, wind erosion, and low fertility, many areas of this soil are left in grass. Melons and other truck crops are grown on limited areas. Crop yields are low and may be negligible in dry years. Rye is probably the crop best suited to this soil. Lime, manure, and fertilizer are needed to insure best yields.

Buckner loamy sand, 7 to 12 percent slopes (BB)

This soil normally occurs on stream benches above areas of Buckner loamy sand, 1 to 6 percent slopes. Its profile is similar to the representative profile described for the Buckner soils.

Because of severe droughtiness, moderately steep slopes, and erosion by wind and water, only adapted permanent vegetation is suited to this soil.

Buckner loamy sand, 13 to 16 percent slopes (BC)

This soil has a profile similar to the one described for all the Buckner loamy sands. It lies below the Steep rocky lands and on its surface may have limestone and sandstone fragments that have rolled from slopes above.

The suggestions for use and management of Buckner loamy sand, 7 to 12 percent slopes, apply to this soil.

[Chaseburg and Judson Soils

Chaseburg and Judson silt loams, 1 to 2 percent slopes (CJ)

These soils occur in the western part of the county. They have formed from materials washed from Fayette, Downs, or Tama soils. Some of this material was deposited recently, and some of it centuries ago. The Chaseburg and Judson soils generally occur together in small drainageways. They are intermingled in such an intricate pattern that they cannot be separated on a soil map of the scale used.

Representative profiles:

The Chaseburg soil has a light brownish-gray silt loam surface layer about 14 inches thick. It grades into a lighter brownish-gray silt loam that is speckled with gray. Below 30 inches is light yellowish-brown silt loam that continues to depths of several feet.

The Judson soil has a dark grayish-brown silt loam surface layer 18 to 25 inches thick. This layer grades into a lighter yellowish-brown silt loam that usually extends to depths of 4 or 5 feet.

Variations.—Some of the parent materials in the drainageways are from Downs soils, which are darker than the Fayette but lighter than the Tama soils. Some of the areas mapped in this unit therefore are not Chaseburg or Judson soils, but a transition between the two.

Chaseburg and Judson silt loams, 1 to 2 percent slopes, occur along drainageways in narrow areas too small to be managed separately from the surrounding soils. The soils of this mapping unit are very productive, however, especially the Judson. Yields of corn, oats, and alfalfa are normally high.

Because the drainageways often carry large volumes of water during heavy rains, gully erosion becomes serious. As a result, most areas need some grass sod. Where gullies exist, much effort may be required to establish an effective grass waterway.[2]

Chelsea Soils

The Chelsea soils occur on high benches along the larger stream bottoms and on the adjacent uplands. The Chelsea soils of this county are:

Chelsea loamy fine sand, 1 to 6 percent slopes.
Chelsea loamy fine sand, 7 to 12 percent slopes.
Chelsea loamy fine sand, 13 to 25 percent slopes.

These soils are normally associated with the Buckner soils on stream benches, and with the Steep rocky lands of the uplands. Chelsea soils have developed under forest and are low in organic matter. Like the Buckner soils, they are composed mostly of sand. The sand is usually of wind origin, but it was first deposited by rivers.

Representative profile (uneroded soils):

The surface layer, a brownish-gray loose loamy sand about 2 inches thick, grades to a pale-brown loamy sand layer that continues to a depth of 20 inches. Below 20 inches there is a very loose pale-yellow sand. Brown bands of sandy loam 1 to several inches thick are normally present at depths of 4 to 8 feet.

Variations.—Slopes for Chelsea soils vary from nearly level to 25 percent or more. In some places the parent material is from sandstone rather than alluvial sand or wind-reworked alluvial sand. In some places disintegrating sandstone therefore lies below the Chelsea soils at depths of 26 inches or more. Areas underlain by sandstone are few in this county and are normally on the high ridges.

For best plant growth, Chelsea soils need liberal applications of lime, manure, and fertilizer. The cost of applying these materials, however, probably would be more justified on less sandy soils that have fewer management hazards. Chelsea soils have little capacity for holding water, and, as a result, crop yields are not good, even in years with considerable moisture.

Chelsea loamy fine sand, 1 to 6 percent slopes (CR)

This soil occurs mainly on stream benches but occasionally in gently sloping upland areas bordering the streams. Its profile is similar to the representative profile described for the Chelsea soils of this county.

Low fertility, susceptibility to drought and wind erosion, and low productivity are serious problems. Most areas of this soil are therefore used for pasture or timber, or to some extent for melons and other truck crops. Of all the field crops, rye is probably the best suited.

---

[2] For information on control of gullies consult the County Extension Service Director or a local representative of the Soil Conservation Service.

Chelsea loamy fine sand, 7 to 12 percent slopes (Cs)

This soil has a profile similar to the representative profile previously described for the Chelsea soils.

Low fertility, combined with droughtiness and erosion by wind and water, make this soil poorly suited to corn, oats, or other field crops. Permanent pasture or timber are better adapted to this soil than cultivated crops.

Chelsea loamy fine sand, 13 to 25 percent slopes (Ct)

The profile of this soil is similar to the representative profile previously described for Chelsea soils.

The suggestions made for the use and management of Chelsea loamy fine sand, 7 to 12 percent slopes, apply to this soil.

Dodgeville Soil

Dodgeville silt loam, eroded, 10 to 16 percent slopes (Da)

This soil covers a small acreage; it is associated with the Tama and Downs soils in the uplands. The parent material is a thin layer of silty windblown material (loess) lying over weathered limestone bedrock. The windblown layer is commonly about 2 feet thick, but it may vary from 1 to 3 feet. Prairie vegetation originally covered the soil.

Representative profile:

The surface layer, about 8 inches thick, is a dark grayish-brown silt loam. The subsoil from a depth of 8 to about 24 inches is a dark yellowish-brown silty clay loam. It usually contains some rock fragments. The reddish clay below the subsoil rests upon limestone bedrock.

Variations.—The thickness of the loess over the reddish clay is the main variation in the Dodgeville soils. The surface layer ranges from about 16 inches to 32 inches in depth. Past erosion has brought about this variation. In some places only an inch or two of the original dark-colored surface layer remains. The thickness of the reddish gritty clay below the subsoil also varies. It ranges from very thin to several inches thick and is absent in a few places.

Because of its steep slopes and shallow depth to bedrock, this thin soil should not be cropped unless measures are taken to control erosion. If contour cultivation or stripcropping is practiced, a rotation of corn, oats, and 3 years of meadow can be used. Soil tests should be made before lime and fertilizers are applied. Recommendations of the County Extension Service Director on rates and methods of fertilization and liming should be followed.

Dorchester Soils

The Dorchester soils, the most extensive bottom-land soils in the county, are on the flood plains of every stream of any size. The Dorchester soils are:

Dorchester silt loam, 0 to 1 percent slopes.
Dorchester silt loam, overflow phase, 0 to 1 percent slopes.

These soils are associated with the soils that have developed from mixed alluvium. They occur below the various soils of the benches and often are directly below the Steep rocky lands or the Quandahl soils of the uplands. Much of the Dorchester soil material has been deposited since cultivation began in the county.

Representative profile:

The surface layer is a dark grayish-brown friable silt loam that contains lime. The layer is normally 36 inches or more thick. Below the limy silt loam surface layer there is normally a black silty clay or silt loam that may or may not contain lime. This black layer represents the original soil of the bottom land that has been buried by recent wash.

Variations.—The Dorchester soils vary mainly in thickness of the limy silt loam layer that overlies the dark buried soil. This layer is normally 3 feet thick, or more, but in some places it may be only 10 inches thick. Areas of Dorchester soils near the mouth of the upper Iowa River and on bottoms along the Mississippi River generally have a thinner surface layer of limy silt loam than the Dorchester soils in other parts of the county. The texture is sandy in some places. The profile may contain thin layers of sand.

Dorchester soils not subject to frequent flooding are well suited to the production of corn. When not flooded in the spring, they produce a moderately high yield of corn. Lime is not needed, and soil tests will show if there is a need for phosphorus or potassium. If overflow is not too severe, these soils should also be tested for their need for nitrogen fertilizer.

Dorchester silt loam, 0 to 1 percent slopes (Dc)

This soil has a profile like that described for the Dorchester series.

Where the flood hazard is not too great this soil is well suited to growing of corn, and yields are moderately high. Flooding every few years continually deposits material on the soil. Yields would be benefited by growing a legume crop occasionally, and the use of nitrogen fertilizer might be profitable. Soybeans are also suited to this soil.

Dorchester silt loam, overflow phase, 0 to 1 percent slopes (Dd)

This soil has a profile similar to the representative profile described for Dorchester soils. It is flooded more frequently than the other Dorchester soil.

Management suggestions given for Dorchester silt loam, 0 to 1 percent slopes, apply to this soil.

Downs and Tama Silt Loam Soils

Downs silt loam and Tama silt loam soils occur together in the uplands and on benches along the larger streams in the county. They have formed from silty windblown material and, in places, are so intermingled—or the change is so gradual from the one soil to the other—that they cannot be separated on a soil map of the scale used. The mapping units are as follows:

Downs and Tama silt loams, bench position, 1 to 4 percent slopes.
Downs and Tama silt loams, bench position, 5 to 7 percent slopes.
Downs and Tama silt loams, bench position, eroded, 8 to 12 percent slopes.
Downs and Tama silt loams, 4 to 7 percent slopes.
Downs and Tama silt loams, eroded, 8 to 12 percent slopes.

These soils occur on stream benches where the average slope is about 2 percent, on ridgetops with slopes averaging 5 percent, and on hillsides. Little of the dark-colored plow layer has been eroded from the soils on the stream benches and ridgetops. On the hillsides, however, where the slopes average 10 percent, much of the original surface soil has been lost.

The Downs soils developed under cover of prairie vegetation and trees or in areas where the prairie vegetation recently had been replaced by trees. As a result, the surface layer is lighter colored than that of the Tama soils, which developed under prairie vegetation. The Tama soils contain more organic matter and nitrogen than the Downs. In both soils, the subsoil is favorable for plant growth.

Representative profiles (virgin soils):

The Downs soils have a light brownish-gray silt loam surface layer about 12 inches thick. From about 12 to 36 inches, the subsoil is a light yellowish-brown silty clay loam. Below 36 inches the subsoil becomes a light yellowish-brown friable silt loam.

The Tama soils have a dark grayish-brown silt loam surface layer about 12 inches thick. The subsoil, a yellowish-brown silty clay loam, extends to a depth of about 36 inches. This layer grades into a light yellowish-brown friable silt loam.

Variations.—The surface layer of the Downs soils varies from a light brownish gray to a dark grayish brown. The Downs subsoil ranges from yellowish brown to grayish yellow-brown. Both the surface layer and subsoil of the Downs soil therefore approach the coloring of corresponding layers in the Tama soil. Where the surface layer of Downs soils is uneroded, it varies from 6 to 12 inches in thickness.

The fertility of the uneroded Downs and Tama soils is moderately high, but lime is needed to correct acidity. Some phosphorus and potassium fertilizers should be applied for best results when hay or pasture mixtures are seeded.

Downs and Tama silt loams, bench position, 1 to 4 percent slopes (DM)

These soils lie along the larger streams in the county. The profiles are similar to the representative profile previously described for all Downs and Tama soils. Erosion is not serious on these gentle slopes.

These soils have no particular management problems. For best results with legume-grass meadows, some lime and phosphorus are needed. Barnyard manure or nitrogen fertilizer would improve yields of second-year corn.

Downs and Tama silt loams, 4 to 7 percent slopes (DK)

These soils have a profile similar to that described for all Downs and Tama silt loams. Erosion has removed some of the surface soil, but about 8 or 10 inches of this dark-colored layer remains.

These soils are well suited to crops. Care should be taken to control further erosion, and meadow crops should be planted frequently. If erosion is controlled, high yields of corn can be had from a corn, corn, oats, meadow, meadow rotation. Barnyard manure or nitrogen fertilizers furnish nitrogen for second-year corn.

Downs and Tama silt loams, bench position, 5 to 7 percent slopes (DN)

These soils require about the same management as Downs and Tama silt loams, 4 to 7 percent slopes. Yields under the same treatment will be about the same.

Downs and Tama silt loams, eroded, 8 to 12 percent slopes (DL)

These soils have profiles similar to the one previously described for Downs and Tama soils in general, but they occur on stronger slopes. Erosion has removed much of the dark-colored surface layer; about 4 to 8 inches of topsoil remains.

Meadow crops should be grown frequently to help control erosion and maintain soil fertility. Corn can be grown more often when contour cultivation, contour stripcropping, and other erosion control practices are used. Soil tests should be used as a guide for choosing fertilizers and for adding lime to correct acidity.

Downs and Tama silt loams, bench position, eroded, 8 to 12 percent slopes (Do)

Except for their bench position, these soils are similar to Downs and Tama silt loams, 8 to 12 percent slopes, and their management requirements are the same. Crop yields will also be similar if the soils are handled in like manner.

Dubuque Soils

Dubuque soils do not occupy large areas in Allamakee County. They occur on small ridges and steep slopes, usually in the rough upland sections of the county. The Dubuque soils are:

Dubuque silt loam, 4 to 8 percent slopes.
Dubuque silt loam, eroded, 10 to 16 percent slopes.

These soils developed from a thin layer of loess (silty windblown materials) deposited or weathered from limestone bedrock. This loess is normally about 2 feet thick but may range from 1 to 3 feet. The Dubuque soils developed under forest and are associated with the Fayette soils of the uplands.

The Dubuque and Fayette soils are similar in the upper part of the profile. They differ in depth to bedrock. The Dubuque soils normally are 2 to 3 feet deep to bedrock, whereas Fayette soils are 3 to 10 feet or more to bedrock, as shown in figure 3, *A*.

Representative Dubuque profile (cultivated soils):

The light-colored brownish-gray silt loam surface layer is about 8 inches thick. The subsoil, extending to a depth of 24 inches, is a yellowish-brown silty clay loam that has a few rock fragments in the lower part. Below the subsoil is a reddish clay that rests on limestone bedrock.

Variations.—The slopes of Dubuque soils range from 4 percent on ridgetops to 16 percent on hillsides. On the ridgetops most of the original surface layer is intact, but on the sloping areas erosion has worn away most of the topsoil. The reddish gritty clay below the subsoil also varies in thickness; it may be very thick, several inches thick, or, in a few places, absent.

Some lime will be needed to correct soil acidity and to insure good legume-grass meadow. Soil tests should be made to determine the need for lime, phosphorus, and potassium.

Dubuque silt loam, 4 to 8 percent slopes (Du)

This soil has about the same profile as that described for Dubuque soils in general.

Since this soil is shallow to limestone bedrock, erosion should be controlled and soil losses kept to a minimum. Intertilled crops should be planted only if contour cultivation or contour stripcropping is practiced.

Dubuque silt loam, eroded, 10 to 16 percent slopes (Dv)

The profile for this Dubuque soil is similar to the profile described for Dubuque soils in general. Most of the surface layer has been eroded; only 1 to 4 inches remains. The slope varies considerably but averages about 12 percent.

Because this soil is shallow over bedrock and occurs on steep slopes, erosion should be kept to a minimum.

Fayette Soils

Fayette soils cover the largest area in Allamakee County. They occur in the uplands and on benches along stream valleys. The Fayette soils are:

Fayette silt loam, bench position, 1 to 4 percent slopes.
Fayette silt loam, bench position, 5 to 7 percent slopes.
Fayette silt loam, bench position, eroded, 8 to 14 percent slopes.
Fayette silt loam, 4 to 7 percent slopes.
Fayette silt loam, eroded, 8 to 14 percent slopes.

In the uplands the Fayette soils are associated with Dubuque, Downs, and Tama soils, and the Steep rocky lands. Along the stream valleys they occur on benches in association with Downs and Tama soils and, occasionally, with Waukegan, Alvin, and Zwingle soils.

The light-colored Fayette soils are naturally well drained. They have developed from loess (silty windblown material). The subsoil is favorable for plant growth. The original cover was a mixture of oak and hickory, with some basswood, elm, and other hardwoods in places.

Representative profile (uneroded soils):

The light-colored, brownish-gray silt loam surface soil is about 8 inches thick. From about 8 inches down to 28 inches is the subsoil, a yellowish-brown silty clay loam. Below the subsoil is a lighter yellowish-brown layer that contains less clay and is more friable (fig. 3, *A*).

Variations.—Fayette soils differ in thickness of the surface soil and in the steepness of the slopes on which they occur. On uneroded Fayette soils the surface layer may be 8 to 10 inches thick, but the eroded (thin surface layer) soils may have lost most, or all, of their topsoil. The Fayette soils range from gently sloping on the tops of ridges and on stream benches to as steep as 16 percent on the sides of the ridges. Most of the original surface layer has been retained on the ridges and stream benches, but on the strong slopes much of the topsoil has been lost.

Some lime usually will be needed to correct the acidity of Fayette soils and to insure successful stands of legumes. Soil tests should be run to find out the needs.

Fayette silt loam, bench position, 1 to 4 percent slopes (Fc)

This soil occurs on benches bordering stream bottoms. Because the slopes are usually less than 4 percent, little erosion takes place. About 6 to 10 inches of the surface layer now remain. The general profile description for Fayette soils applies to this soil.

This Fayette soil, like others in the Fayette series, is low in the organic matter necessary for good soil structure and for furnishing nitrogen. Some lime will be needed to correct acidity. Soil tests should be run to determine fertilizer needs.

Fayette silt loam, 4 to 7 percent slopes (Fa)

This soil has a profile similar to the representative profile previously described for Fayette soils. It has 6 to 8 inches of surface soil.

This soil, like other gently sloping Fayette soils on stream benches, is naturally well drained and easily farmed. It is subject to moderate erosion because it occurs on more sloping ridgetops. Erosion control should be practiced, and crops should be planted in suitable rotations. If corn is planted on the contour and is contour stripcropped, meadow crops can be grown in the rotation less frequently. When corn is grown under suitable erosion control practices, barnyard manure or nitrogen fertilizer should be added for the corn the second year.

Lime usually will be needed to correct soil acidity. Soil tests should be made to determine fertilizer needs. Phosphorus will also be needed for legume-grass seedings, and potassium will benefit corn.

Fayette silt loam, bench position, 5 to 7 percent slopes (Fd)

This soil is on a bench position. Its use and management are similar to those of Fayette silt loam, 4 to 7 percent slopes. The two soils should be treated in the same manner.

Fayette silt loam, eroded, 8 to 14 percent slopes (Fb)

The profile description for Fayette soils in general is applicable to this soil, but the surface layer is more eroded. Only about 1 to 4 inches of topsoil remains. Although this soil varies in slope, the dominant range is about 10 to 12 percent.

This soil should be protected from further erosion, and fertility should be improved. If the soil is to be cropped and good yields are to be obtained, meadow crops should be grown often, suitable rotations should be followed, and the slopes should be cultivated on the contour or contour stripcropped. Soil tests should be made to determine lime and fertilizer needs.

Fayette silt loam, bench position, eroded, 8 to 14 percent slopes (FE)

This eroded soil on stream benches needs use and management like that for Fayette silt loam, eroded, 8 to 14 percent slopes.

Judson Soils

The Judson soils have developed from silty dark-colored material washed from upland soils. They are:

Judson silt loam, 1 to 6 percent slopes.
Judson silt loam, 7 to 12 percent slopes.

Judson soils have formed at the base of upland slopes and on low stream benches. They are associated with various soils of the benches and bottom lands. Grass was the original cover.

Representative profile (uneroded soil):

The dark grayish-brown silt loam surface soil is about 18 inches thick. A light yellowish-brown silt loam lies below the surface layer.

Variations.—Judson soils vary from nearly level on the benches to steep on the upland slopes. The dark-colored surface layer ranges from 15 to 30 inches in thickness. The surface soil may be somewhat sandy where Judson soils adjoin sandy areas.

In places a light-gray layer occurs at depths of 20 to 25 inches. If these areas were more extensive, they would have been named and mapped separately, as they are somewhat more poorly drained than Judson soils. They occur in the northeastern quarters of sections 5 and 15 in Franklin Township.

During heavy rains Judson soils receive occasional deposits of wash from adjoining uplands. Internal drainage is usually rapid enough to remove excess water. Sheet erosion takes place on the stronger slopes. Because lime may be needed in the legume-grass meadows, the soils should be tested to find the amount required. Judson soils are highly productive.

Judson silt loam, 1 to 6 percent slopes (JU)

The soil profile describing Judson soils in general is applicable to this soil. It is one of the most fertile soils in the county and is farmed intensively.

This soil is well suited to cultivation and produces good crops of hay. Some gully erosion takes place where this soil occurs on stream benches near the mouth of small valleys. Lime may be needed to get the best stand of legumes.

Judson silt loam, 7 to 12 percent slopes (JV)

This soil has a profile like that previously described for Judson soils. It is not extensive and occurs at the foot of a few upland slopes.

Because this soil lies at the base of steep slopes, sheet erosion is serious. If meadow crops are planted frequently, the erosion losses can be kept to a minimum. If the farmer also uses contour cultivation or contour stripcropping, he may plant corn more often. The soil should be tested for its lime and fertilizer needs.

Mixed Alluvial Soil

Mixed alluvium, 2 to 5 percent slopes (MA)

This land type occurs in small drainageways bordered by Steep rocky lands. It has formed from materials washed from adjacent steep slopes and upland soils.

Representative profile:

This soil is often a dark-colored loam which gradually becomes a lighter color with depth. However, light- and dark-colored sands and silts, plus rock fragments of all sizes, may occur in any proportion or combination. Thin layers of small fragments may occur within the profile, or rocks of various sizes may be scattered throughout the subsoil and on the surface. The content of lime depends on the source of the parent material.

Areas of Mixed alluvium are narrow and are usually cut up by wandering water channels. The channels may overflow during heavy rains and spread various sized rock fragments and sand over the adjoining surface. Because Mixed alluvium occurs in small areas subject to overflow, it is best suited to permanent pasture or trees.

Quandahl Soils

The Quandahl soils occur at the base of steep upland slopes. They are:

Quandahl silt loam, 7 to 12 percent slopes.
Quandahl silt loam, 13 to 16 percent slopes.
Quandahl silt loam, 17 to 24 percent slopes.

Quandahl soils lie below Steep rocky lands and above the various soils of the benches and flood bottoms. They have developed at the base of steep slopes from material removed from the uplands.

These materials wash or roll down and accumulate at the base of the slopes. They consist of residuum weathered from limestone, sandstone, or shale rocks that occur on the steep slopes. In places they also include loess (a silty windblown material). The Quandahl soils therefore may contain many fragments of sandstone, limestone, or shale, or may consist primarily of loose materials that have weathered from these rocks. The surface layer is generally silty, although in places it may be a stony silt loam or a sandy loam.

These soils have a light color resembling that of Fayette soils, because soils of both series have developed under a native cover of trees.

Representative profile (uneroded soils):

The surface layer is a grayish-brown silt loam about 8 inches thick. It contains variable amounts of limestone and cobblestones and boulders of sandstone. The subsoil, extending to a depth of about 24 inches, is a yellowish-brown silty clay loam that may have numerous stone fragments. A light yellowish-brown silt loam, generally with many imbedded stone fragments, occurs below the subsoil.

Variations.—Quandahl soils occur on slopes ranging from 7 to more than 24 percent. Some of the soils have lost most, or all, of their topsoil through erosion; others have retained most of the original surface layer.

Some dark-colored Quandahl soils occur in the county. They have the same variations in texture and rock content as the light-colored Quandahl soils but they have been darkened by seepage from adjacent limestone bluffs.

Quandahl silt loam, 7 to 12 percent slopes (QA)

This soil has a profile like that previously described as representative of the Quandahl soil.

This soil erodes easily, and further cultivation may result in serious damage. Pasture or meadow is the best use because a permanent cover holds erosion to a minimum. If corn is to be grown, the soil should be cultivated on the contour, and if the slopes are sufficiently long, contour stripcropping would be desirable. Soil tests should be made to find out lime and fertilizer needs.

Quandahl silt loam, 13 to 16 percent slopes (QB)

The profile of this soil corresponds to that described for Quandahl soils in general. Much of this soil has been under permanent cover. Where areas have been cultivated, 50 percent or more of the original surface layer usually has been lost.

Because of its steep slopes, this soil is not well suited to corn. Under cultivation, runoff is rapid and erosion becomes serious. Permanent pasture and forest are therefore the best uses for this soil. In a long rotation, corn can be grown occasionally. This soil has uniform slopes suitable for contour cultivation. Some of the slopes are long enough to be stripcropped. When erosion-control measures are practiced, a rotation of corn, oats, and 3 years of meadow is suggested. Soil tests should be run to find lime and fertilizer needs.

Quandahl silt loam, 17 to 24 percent slopes (QC)

The profile of this soil is like the one described as representative of Quandahl soils.

Slopes are so steep that serious erosion may result if only an occasional corn crop is grown on this soil. It therefore should be in permanent pasture or forest. Pasture can be renovated by plowing and seeding pasture plants with a nurse crop of oats.

Sandy Escarpment

Sandy escarpment, 18 to 30 percent slopes (SA)

This sloping land is on the sides of stream benches. It lies below soils of the benches and above the soils of the flood bottoms. It is the sloping remnant of soils of the stream benches that have been destroyed by erosion.

This land should not be used for crops, as many areas are subject to very severe gully erosion. Only sparse grasses can grow on it, and if it is overgrazed, further serious gully erosion may result. Erosion of this land may destroy the productive bench soils above the escarpment and deposit sandy materials on the fertile soils of the flood bottoms.

Schapville Soil

Schapville silt loam, 4 to 7 percent slopes (SH)

This soil is associated with Fayette and Dubuque soils on saddle-like spur ridges. It has developed from a thin layer of loess that overlies shale (table 4). The original cover was prairie grasses and scattered trees.

Representative profile:

The surface layer is a very dark grayish-brown silt loam. The subsoil, extending from about 9 to 17 inches, is a dark grayish-brown silty clay loam. A limy, very heavy clay shale, olive green in color, occurs below the subsoil.

Variations.—The surface layer and subsoil occasionally contain more clay than shown in table 4. In a few places not large enough to be shown separately on the map, the silty surface soil is light colored. This light-colored variation has developed under forest and is lower in organic matter and nitrogen than the typical Schapville silt loam, 4 to 7 percent slopes.

The heavy compact subsoil causes poor internal drainage. During wet years the soil remains saturated and is hard to cultivate. Areas of this soil are often so small that they must be farmed with the surrounding land. The soil is suitable for hay or pasture. A suitable rotation would be oats followed by 3 years of meadow. For best growth of legume-grass meadow, some lime should be added. Soil tests will indicate need for fertilizer and lime.

TABLE 4.—*Particle-size analysis of Schapville silt loam* [1]

Sample No.	Depth	Sand	Silt	Clay
	Inches	*Percent*	*Percent*	*Percent*
339320	0– 2	5. 1	66. 1	28. 8
339321	2– 7	3. 8	65. 5	30. 7
339322	7– 9	3. 3	63. 4	33. 3
339323	9–12	3. 7	60. 5	35. 8
339324	12–17	2. 7	50. 3	47. 0
339325	17–23	4. 8	21. 9	73. 3
339326	23–29	33. 7	52. 6	13. 7
339327	29–36	5. 4	23. 0	71. 6

[1] Analysis made in laboratories of Bureau of Plant Industry, Soils, and Agricultural Engineering, United States Department of Agriculture.

Silty Escarpment

Silty escarpment, 15 to 25 percent slopes (SB)

The main difference between this land and Sandy escarpment, 18 to 30 percent slopes, is that the material exposed on these escarpment slopes is silty rather than sandy. Otherwise, the two soils are much alike and should be managed in the same manner.

Sogn Soil

Sogn silt loam, 4 to 7 percent slopes (So)

This soil occupies small ridges that usually occur above the Steep rocky lands. This soil and the Rocky lands are often mapped together on the stronger slopes. The original cover for this soil was grass and trees.

Representative profile:

The very dark grayish-brown silt loam surface layer ranges from 2 to 10 inches thick. The subsoil is a light grayish-brown silt loam to silty clay loam, usually 2 to 6 inches thick. The subsoil rests on limestone bedrock.

Variations.—The number of loose limestone fragments varies from place to place. The fragments are scattered over the surface and throughout the profile. In some areas the dark-colored surface layer rests on limestone bedrock.

This soil is too shallow over bedrock for cultivated crops. Unless the seasons are very wet, tilled crops are severely injured by drought. This soil, like other Sogn soils, is best suited to permanent pasture or trees.

Steep Rocky Lands

Steep rocky lands lie along stream borders on rocky rims that extend for considerable distances into the upland. The mapping units are:

Steep rocky land, 18 to 30 percent slopes.
Steep rocky land, 30 to 60 percent slopes.

The Steep rocky lands generally lie above the Quandahl soils and also above bench soils and soils of the bottom lands. The Dubuque, Fayette, and, occasionally, the Chelsea soils occur above these Steep rocky lands.

The areas designated as Steep rocky lands have no typical soil profile. They have developed under different environments and from various parent materials. The different soils are mixed closely together in an area. One color or texture may predominate for a whole slope, or for only part of a slope. The original cover was grass, trees, or a mixture of both. Because of the difference in vegetation the surface soil may be dark colored, light colored, or intermediate in color.

One common profile is a layer 6 to 12 inches thick of light- to dark-colored sandy material that rests on sandstone bedrock. Another profile frequently noted is a dark- to intermediate-colored loam to silt loam surface layer, 4 to 12 inches thick, that overlies limestone bedrock. A light-colored silt loam surface layer, 8 to 18 inches thick, occurs less frequently. This light-colored surface layer contains variable amounts of limestone fragments and rests directly on solid bedrock or on broken bedrock.

In many areas the loose topsoil material is very thin or absent and the solid bedrock is exposed, but more often the surface is dotted with stone fragments. The stones vary from small cobblestones to huge outcrops of bedrock ledges (fig. 6).

The Steep rocky lands can be used only for pasture or trees. The pasture is so poor and the landscape so varied that expenditures for improvement would be unwise.

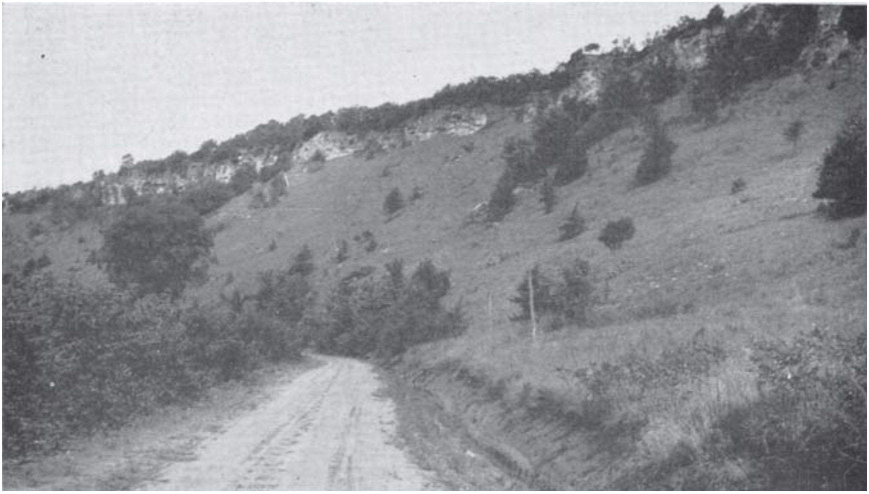


***Figure 6.*—Steep rocky land dotted by stone fragments and bedrock ledges.**

Steep rocky land, 18 to 30 percent slopes (Sr)

This land borders the smaller valleys in the county and also occurs along narrow rock rims in the uplands. The general discussion of Steep rocky lands applies to this mapping unit.

This land furnishes some pasture of poor quality. Most areas are covered with oak and hickory trees of merchantable size.

Steep rocky land, 30 to 60 percent slopes (St)

Most of this land borders the larger stream valleys in the county. The conditions described under the heading Steep Rocky Lands apply to this mapping unit.

These strong rocky slopes furnish very poor pasture. The slopes facing south and west, exposed to the afternoon sun and drying southerly winds, provide a sparse growth of very poor pasture and timber. On the north- and east-facing slopes, some trees grow to merchantable size.

Tama Soils

Tama soils occur with the Downs and Fayette in the uplands, adjacent to Downs and Fayette soils on stream benches, and above the Dorchester soils of the bottom lands. The Tama soils that have "bench position" in their name usually occur on both high and low benches along the major streams of the county, such as the Upper Iowa and Yellow Rivers. Tama soils occur mainly in the west-central part of the county (fig. 3, *B*). They are:

Tama silt loam, 4 to 7 percent slopes.
Tama silt loam, eroded, 8 to 12 percent slopes.
Tama silt loam, bench position, 1 to 4 percent slopes.
Tama silt loam, bench position, 5 to 7 percent slopes.

The dark, well-drained, and productive Tama soils developed from loess (silty windblown material) under a native cover of prairie vegetation. In some areas, however, trees had invaded the prairie. The subsoil is very favorable for plant growth.

Representative profile (uneroded soils):

The dark grayish-brown silt loam surface layer is about 12 inches thick. The subsoil, a yellowish-brown silty clay loam, is 12 to 36 inches thick. It contains somewhat more clay than the surface layer but is moderately permeable to water. Below the subsoil, the material becomes more friable and a lighter yellowish brown.

Variations.—Slopes of Tama soils range from 1 percent on the nearly level stream benches to 12 percent on the uplands. The areas on stronger eroded slopes have lost most of the original surface layer, which was high in organic matter.

Tama soils are highly productive (see table 2). Soil tests should be taken to determine the lime and fertilizer needs.

Tama silt loam, bench position, 1 to 4 percent slopes (Tc)

This soil occurs on benches bordering the larger streams in the county. Its profile is similar to that just described for other Tama soils. It is like the Tama soils in the uplands that have a gentle slope. Because of its more nearly level position on stream benches, however, less of the original surface layer has been eroded, and the topsoil is thicker. This soil is easy to manage because erosion is not a factor. Barnyard manure or nitrogen fertilizer should be used if corn is planted the second year. Soil tests should be made to determine need for fertilizer and lime.

Tama silt loam, 4 to 7 percent slopes (Ta)

The profile of this soil is like that of other Tama soils previously described. It occupies gently sloping ridgetop divides in the west-central part of Allamakee County.

This soil is well suited to corn, oats, and meadow. It occurs on slopes, so erosion ought to be controlled. Meadow crops should be grown frequently to hold the soil in place and to protect areas on the slopes below. If erosion is controlled, high yields of corn can be maintained by using a rotation consisting of corn for 2 years, oats, and meadow for 2 years. Barnyard manure or nitrogen fertilizer should be added to second-year corn plantings to supply nitrogen. Soil tests should be made to determine need for lime and fertilizer.

Tama silt loam, bench position, 5 to 7 percent slopes (Td)

This Tama soil has a profile similar to that described as representative of Tama silt loams. It can be managed in the same way as Tama silt loam, 4 to 7 percent slopes.

Tama silt loam, eroded, 8 to 12 percent slopes (Tb)

This eroded soil has a profile similar to that previously described for Tama soils, except that all but about 4 to 10 inches of the surface layer has been removed by erosion.

Fertility should be improved; erosion should be controlled; and meadow crops should be grown about every third year on this soil.

If erosion control practices such as contour cultivation or contour stripcropping are used, corn can be planted more often. Barnyard manure or nitrogen fertilizer should be applied if corn is grown a second year.

Some organic matter, nitrogen, and phosphorus have been lost because the original surface layer has been eroded. Soil tests should be made to determine need for fertilizer and lime.

Volney Soil

Volney loam, 2 to 6 percent slopes (Vo)

This soil is associated with Mixed alluvium and Dorchester soils at the mouths of small drainageways in the steep parts of the county.

Representative profile:

The surface is a very dark-brown friable loam about 15 to 20 inches thick. Below this layer is a very dark grayish-brown loam that usually contains large numbers of limestone and sandstone fragments.

Variations.—In some areas the surface soil is 10 to 30 inches thick. In other places the surface layer is free of stones and the subsoil contains only a few fragments. These less stony areas contrast with the normal areas, which have large numbers of stone fragments scattered throughout the profile.

Some areas of Volney loam, 2 to 6 percent slopes, are used for crops, but most of this soil could be better used for pasture or trees. The great quantity of stone fragments throughout the profile makes cultivation difficult. Stream channels flow through most areas and may overflow during heavy rains and spread sand and rock fragments over the adjoining land.

Where crops are grown on this soil, a suitable rotation would be 2 years of corn, oats, and meadow. No lime would be needed, but the soil should be tested to determine its need for fertilizer.

Waukegan Soil

Waukegan loam, shallow phase, 1 to 3 percent slopes (Wa)

This soil lies on benches along the larger streams in the county. It has formed from sandy alluvium, and development took place under a cover of prairie vegetation.

Representative profile:

The surface layer is a dark grayish-brown loam, 9 to 14 inches thick. The subsoil, 8 to 16 inches thick, is a grayish-brown to yellowish-brown loam to sandy loam. Loose sand and gravel usually occur at depths of 15 to 25 inches.

Variations.—The depth to loose sand and gravel varies considerably. Sand and gravel occur at 12 inches in some places, and in others at 30 inches or more. Although the surface layer is mostly a loam, in places a sandy loam topsoil occurs. A few areas have sandy loam in both the surface soil and subsoil. If these were more extensive, they would have been named and mapped as separate soils.

Because of its susceptibility to drought, the Waukegan soil is often kept in pasture or used for hay. Rye would be the best field crop. Where the plow layer and subsoil are not too sandy, corn can be grown in a rotation made up of 2 years of corn, oats, and meadow. Soil tests should be made to determine need for lime and fertilizer.

Zwingle Soil

Zwingle silt loam, 1 to 4 percent slopes (Zw)

This soil occurs on high stream benches along the Mississippi River and its tributaries. It has formed from water-laid materials that have a high clay content. Development took place under a forest cover (fig. 7).

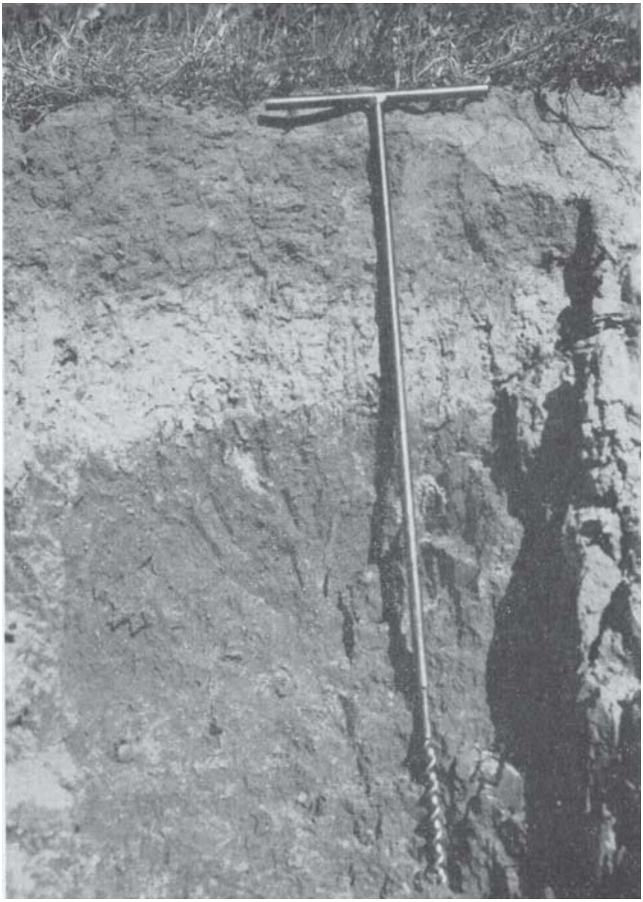


Figure 7.—**Profile of Zwingle silt loam, which developed under forest cover from water-laid materials high in clay.**

Representative profile:

The 4-inch surface layer is a grayish-brown silt loam. In some places it contains enough clay to make it a silty clay loam (see table 5). A light ashy-gray layer, 4 inches thick, lies below the surface soil. At depths of 8 to 12 inches the subsoil is a reddish-brown very heavy clay, which becomes grayer with increasing depth. At 50 to 60 inches the soil may become somewhat sandy.

Variations.—In places the subsoil is brownish gray rather than reddish brown to pinkish brown

The fine-textured clay subsoil interferes with internal drainage. Surface drainage is frequently very slow because the stream benches have such gentle slopes. Because of its poor drainage, this soil is best suited to hay, pasture, or trees. Cultivated crops can be grown, but yields are low.

If it is to be cultivated, this soil should be tested to determine need for lime and fertilizer.

TABLE 5.—*Particle-size analysis of Zwingle silt loam* [1]

Sample No.	Depth	Sand	Silt	Clay
	Inches	*Percent*	*Percent*	*Percent*
339372	0–1½	9. 0	59. 2	31. 8
339373	1½–5	7. 0	63. 7	29. 3
339374	5–8	5. 8	59. 5	34. 7
339375	8–17	. 6	20. 8	78. 6
339376	17–27	. 3	22. 4	77. 3
339377	27–38	. 5	35. 8	63. 7
339378	38–44	. 5	37. 8	61. 7
339379	44–45	. 5	35. 1	64. 1
339380	55–64	1. 4	43. 8	54. 8

[1] Analysis made in laboratories of Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture.

FORMATION AND CLASSIFICATION OF ALLAMAKEE COUNTY SOILS

This section consists of two main parts. The first describes how the five major factors of soil formation have interacted to form the soils in the county. The second explains the system of soil classification, places the soils of the county in orders and great soil groups, and gives representative profiles for each great soil group.

Factors of Soil Formation

The interaction of five major factors produces soil. These five are (1) parent material; (2) vegetation; (3) topography, or lay of the land; (4) climate; and (5) time, or age of the landscape.

Because different factors dominate in different places, we have many kinds of soil. In Allamakee County, the interaction of the five factors is such that these important processes are evident:

1. Leaching of bases and development of acidity in the solum.
2. Formation of clay in the A and B horizons, chiefly clay of high exchange capacity and mostly of the montmorillonite-illite kind.
3. Accumulation of clay in the B horizon by movement from the A horizon, by formation in place in the B, or by both processes.

The processes take place at different rates in different soils. The processes are not so active in sandy or clayey soils. In silty and loamy parent materials (loess and till), the leaching process and the development of B horizons having a concentration of clay are more rapid. Soils developing under the influence of a fluctuating water table show concentration of clay sooner than those not so influenced. The water filtering through the soil causes more leaching and greater formation of clay in the B layer.

The Fayette, Downs, and Tama soils of this county show moderate development of textural B horizons, but as will be explained later under the heading, Time, are considered to represent a medium stage of development for the respective great soil groups in which they are placed.

Accumulation of organic matter is also an important process in the thick surface layers of some of the soils. In the Tama and Judson soils, which developed under prairie vegetation, the zone of organic-matter accumulation is 10 to 20 inches thick. In contrast, the Fayette and Dubuque soils, which developed under forest, have only a thin layer in which organic matter has accumulated.

Prairie vegetation, mainly big bluestem (*Andropogon gerardi*), was growing on soils such as the Tama before the early settlements were made. New root systems formed each year. The old roots became organic matter in the soil. Soils like the Fayette formed under forest and received an annual addition of organic matter, but not in the same way as did the Tama soils. Leaves, twigs, and other forest litter were deposited on the surface, where they decomposed rapidly. The root system of trees, unlike that of prairie vegetation, was renewed gradually, not every year. Thus in Allamakee County, less organic matter accumulated in soils formed under forest influence than in soils formed under prairie vegetation.

Origin of parent materials

Allamakee County is part of the Driftless area, an unglaciated region more than 6,000 square miles in extent, that covers parts of Minnesota, Wisconsin, and Illinois (*10*).[3] Some of the more level parts of the county are considered to be remnants of the Dodgeville peneplain, which was formed by an erosion cycle that preceded the glacial age.

The soil series of Allamakee County can be grouped according to source of parent material as follows:

Parent material	*Soil series*
Loess of silt loam to silt texture	Fayette, Downs, Tama.
Loess of silt to silt loam texture over weathered limestone or limestone bedrock.	Dodgeville, Dubuque, Sogn.
Loess of silt to silt loam texture over shale	Schapville.
Mixed debris from loess and limestone	Quandahl.
Sand deposited by wind or water, with some material from underlying limestone.	Buckner, Chelsea.
Sandy loam over coarse sand or gravel deposited by water.	Alvin, Waukegan.
Clay deposited by water	Zwingle.
Silt loam or loam deposited by water	Judson, Chaseburg, Dorchester, Volney.

[3] Italic numbers in parentheses refer to Literature Cited, p. 51.

The Fayette, Downs, and Tama soils have formed from windblown silty material called loess (*2*, *4*, *5*).[4] It is believed that this material was blown from the Iowan glacial drift plain thousands of years ago. According to Ruhe and Scholtes, the loess of Allamakee County was deposited about 16,000 to 24,000 years ago (*6*). The loess on the uplands and higher terraces apparently was deposited during or after the advance and retreat of the Iowan glacier, so it is called Iowan loess. The Iowan glaciation was an early stage of the Wisconsin glacial age.

In this county the thickness of the loess deposit varies. Little or no loess remains on the steeper slopes, for it was soon removed by erosion. On the more level divides, however, the loess is now about 200 inches thick in places. Borings in the loess show no obvious pattern of thinning such as has been reported in southwestern Iowa (*1*). The loess tends to be thickest in the western part of Allamakee County, as that part is closest to the source, presumably the Iowan drift plain. Table 6 shows the thickness of the loess deposit in level upland areas of the county, and in table 7 are laboratory data for two soils formed from loess.

TABLE 6.—*Thickness of loess at several sites on the nearly level divides in Allamakee County, Iowa* [1]

Location	Depth	Remarks
	Inches	
NE1/4SW1/4 sec. 29, T. 97, R. 4.	216	From 0 to 105 inches, leached; 105 to 216 inches, calcareous; below 216 inches, reddish-brown gritty silty clay loam.
NE1/4NW1/4 sec. 16, T. 97, R. 3.	126	From 0 to 105 inches, leached; 105 to 126 inches, calcareous; below 126 inches, shale underlain by sandstone.
NE1/4SE1/4NE1/4 sec. 7, T. 97, R. 3.	128	From 0 to 120 inches, leached; 126 to 128 inches, calcareous; 128 to 136 inches, glacial drift; below 136 inches, a reddish-brown limestone residuum.
NE1/4SW1/4 sec. 6, T. 99, R. 6.	156	From 0 to 120 inches, leached; 120 to 156 inches, calcareous; below 156 inches, reddish-brown limestone residuum.
NE1/4SW1/4SW1/4 sec. 8, T. 100, R. 5.	86	From 0 to 86 inches, leached; below 86 inches, probably reddish-brown limestone residuum.
Near SW1/4 sec. 32, T. 96, R. 6.	210	From 0 to 90 inches, leached; 90 to 120 inches, calcareous; below 210 inches, a dark-gray silt loam, possibly Farmdale (?) loess.
NW1/4 sec. 28, T. 96, R. 6	180	From 0 to 180 inches, a gritty reddish-brown clay loam, possibly till.

[1] Guy D. Smith, Director, Soil Survey Investigations, Soil Conservation Service, assisted in preparation of this table.

[4] See literature citations *1*, *8*, *9*, and *10* for further information on development of Iowa soils.

TABLE 7.—*Laboratory data* [1] *on two soils formed from loess in Allamakee County, Iowa*

(TAMA BRUNIZEM)

Depth	Horizon	pH	Clay [1] (less than 0.002 mm.)	Exchangeable cations in milliequivalents per 100 grams			
				Ca	Mg	K	H
Inches			*Percent*				
0 to 1.5	A_1	7.0	25.4	26.2	4.5	1.18	(2)
1.5 to 3	A_1	6.2		17.8	4.0	.77	6.2
6 to 9	A_1	5.7		13.1	3.9	.38	7.9
15 to 18	B_2	5.5	27.8	10.0	4.0	.28	5.9
33 to 36	B_3		26.6	12.1	5.2	.36	4.6
36 to 39							
39 to 42							
42 to 45	C_1	5.6	24.0	12.1	5.7	.40	

FAYETTE (GRAY-BROWN PODZOLIC)

Depth	Horizon	pH	Clay	Ca	Mg	K	H
0 to 1	A_1	5.4	13.7	16.3	3.8	0.50	5.7
1 to 3	A_1	4.2	12.0	3.7	1.4	.27	6.2
6 to 8	A_2	4.5	12.9	4.4	1.9	.22	3.9
10 to 12	A_2	4.2	19.6	6.2	2.9	.34	4.7
15 to 18	B_2	4.2	29.0	10.1	4.9	.40	5.3
24 to 27	B_2	4.3	29.2	12.1	5.9	.42	5.1
36 to 39	B_3	4.5	24.5	11.5	5.7	.34	3.9
48 to 51	C_1	4.8	24.0	11.5	5.9	.27	3.2

[1] Clay determined by pipette method, using sodium hexametaphosphate as dispersing agent; hydrogen by Ba $(Ac)_2$ method. Data assembled by F. F. Riecken, Iowa Agricultural Experiment Station.
[2] Not determined.

Borings show that the preglacial sedimentary rocks, or their weathered products, underlie the loess in most places. A few borings indicate the presence of some remnants of weathered glacial drift. Geologists believe that the Nebraskan glacier, the earliest of the glaciers, passed over most of Allamakee County, but that the Kansan, Illinoian, and Wisconsin glaciers did not (*2*). The remnants of glacial drift found in the county therefore would belong to the Nebraskan glaciation.

Borings into the loess disclose some evidence of past glaciation, but glacial till does not outcrop on slopes below the loess. Instead, on slopes below the loess, one finds sedimentary materials deposited before the glacial age, or weathered products of those materials. Dodgeville, Dubuque, Sogn, and Schapville soils occur in such positions. Their upper horizons have developed in loess, and their lower horizons in limestone or shale material. Sandstone underlies the loess in only a few places.

Talus and colluvium from sedimentary rocks (limestone and some sandstone) laid down before glaciation have mixed with the loess to form the parent material of the Quandahl soils. Steep rocky land, a miscellaneous land type, is also forming from this mixed material.

Sands—the parent material for the Buckner and Chelsea soils—are mostly of glacial origin, though in some places the parent materials for Chelsea soils may be of sandstone origin. The sands of glacial origin are mostly of Iowan age, though some are likely of late Wisconsin age. These sands were deposited as outwash and were later reworked by the wind in many places. In some areas the sands have been blown onto some of the steeper taluslike slopes of the limestone bluffs.

The sandy loam and loam materials underlain by gravel are the parent materials for the Alvin and Waukegan soils. These materials occur on stream terraces, mainly near the Mississippi River.

Clayey alluvium, the parent material for the Zwingle soils, likely is of late Wisconsin age. Possibly the material is of post-Iowan age, for loess-covered terraces lie above the terraces on which the Zwingle soils occur.

Alluvium and colluvium of variable age, but most likely of postglacial age, is the material in which the Judson, Chaseburg, Dorchester, and Volney soils are forming. The alluvium and colluvium for the Judson and Chaseburg soils was deposited somewhat earlier than those for the Dorchester and Volney. The Dorchester and Volney soils are on very recently deposited alluvium, to which additional sediments are added when floods occur.

Influence of natural vegetation

This county is in a transitional vegetation zone. Some of the soils have formed under hardwood forest, others under prairie grass, and yet others under both. The soils that have formed under the influence of forest vegetation are the Alvin, Chelsea, Dorchester, Downs, Dubuque, Fayette, Quandahl, Sogn, and Zwingle, and most areas of Steep rocky land. The soils that have developed under prairie vegetation, or under the partial influence of prairie vegetation, are the Buckner, Dodgeville, Downs, Judson, Waukegan, Schapville, Sogn, Tama, and Volney. The Downs and Sogn soils appear in both lists, since they have been influenced by both prairie and forest.

It is commonly thought that soils such as the Downs have developed under a recently advanced forest (*9*). But from morphology of the Tama and Downs soils it seems that forest once covered all the county for a brief time and then receded to some extent. Because of this forest recession, it is possible that Downs and some of the Tama soils have developed in areas where prairie has come back after the forest receded.

The Tama soil is classed as having developed under grass, but this statement is open to question. Some of the Tama soils of Allamakee County have a thick, dark-colored A_1 horizon and a subsoil of subangular blocky structure that shows coatings of gray silts. The thick, dark-colored A_1 is typical of Brunizems, a group of soils that developed under prairie, but the light-gray silts on the B-horizon structure pieces are typical of Gray-Brown Podzolic soils, which have formed under forest. Further study of the transition forest-prairie zone in eastern Iowa will have to be made before it can be decided how soils such as the Downs and the Tama variation in Allamakee County develop. It may be that they form only when forest encroaches on prairie. On the other hand, it may be that they develop where forest replaces prairie briefly, recedes, and prairie comes back again (*8*).

Climate

The annual rainfall is about 33 inches, and the growing season is about 150 days. Under this climate, some minerals are gradually leached out of the upper layers, and in the solum exchangeable bases are replaced by exchangeable hydrogen. Table 6 shows the depths to which the calcareous loess of this county has been leached of lime, and table 7, the exchangeable cations in profiles of two loess-derived soils, the Tama and Fayette. Data on other Fayette soils are given in North-Central Region Publication 46 (*3*).

Comparing soils in different parts of the United States will show how climate affects their development. The Tama and Fayette soils of this county, for example, have lost some carbonate through leaching. In Georgia, where the rainfall is greater than in Iowa, the leaching has washed away most of the carbonates. In eastern Colorado, where the rainfall is less than in Iowa, the soils are rarely leached of carbonates, and many of them are calcareous in the surface layer. The difference in degree of leaching reflects difference in climate.

Topography

Allamakee County ranges from sloping to very steep. The dominant topographic pattern is shown in figure 2, page 8. The ground water table is normally low, so most of the soils have well-oxidized profiles. The common yellow-brown color of the B horizon indicates adequate drainage.

The Schapville (p. 29) and Zwingle (p. 35) soils, which occur on gentle slopes, show the effects of imperfect or poor drainage. The Schapville soil is imperfectly to poorly drained because it is underlain by very slowly permeable olive-gray shale. The profile above the shale is olive gray. Restricted drainage has prevented the development of the yellow-brown color typical of the well-drained soils.

The Zwingle soil has clayey B and C horizons that allow only slow penetration of water. The Zwingle soil, however, usually has an A_2 layer, which indicates that there has been some leaching of materials downward in the profile.

Time

The effect of time as a factor in soil development can be demonstrated by comparing the Fayette and Tama soils of this county with the Lagonda and Clarinda soils of Taylor County, Iowa (*7*). The Fayette and Tama soils have formed from loess material of Iowan age, and the Lagonda and Clarinda soils from Kansan till. The Lagonda and Clarinda soils have been weathering for a considerably longer time than the Iowan loess. The Lagonda and Clarinda soils have clay textured B horizons because of this weathering. The B horizons in the Fayette and Tama soils do not show this accumulation of clay, chiefly because the period of weathering has been shorter.

Classification of Soils

Soils are classified in progressively higher, or more inclusive, categories. The lowest categories of classification are soil phases and types. Soil areas much alike in kind, thickness, and arrangement of layers are mapped as one soil type. The soil phase is a subdivision of the soil type. A soil type is broken into phases primarily because of differences other than in kind, thickness, and arrangement of layers. The slope of a soil, the frequency of bedrock outcropping, or the extent of erosion are characteristics that might cause a soil type to be divided into phases. Soil types, or phases if the type is subdivided, are the units shown on the soil map of this county.

A soil series consists of all the soil types that have similar profiles, but the texture of the surface layer may vary among the various soil types. Texture of the surface layer is the basis on which soil types are separated. A soil series is named for the place where it was first identified; a soil type, for the texture of its surface layer; and a soil phase, for some characteristic significant to practical use that is not found in upper layers of the soil profile. The following illustrates the system of nomenclature in these lower categories of classification:

Series	*Type*	*Phase*
Fayette	Fayette silt loam	Fayette silt loam, 4 to 7 percent slopes.
		Fayette silt loam, eroded, 8 to 14 percent slopes.
		Fayette silt loam, bench position, 1 to 4 percent slopes.
		Fayette silt loam, bench position, 5 to 7 percent slopes.
		Fayette silt loam, bench position, eroded, 8 to 14 percent slopes.

Higher categories of soil classification—great soil groups and soil orders—are of particular interest to soil scientists and others concerned with the nature and development of soils in broad regions or zones. The soil series of this county are classified by soil orders and great soil groups as in table 8.

TABLE 8.—*Soil series of Allamakee County, Iowa, classified by order and great soil groups*

Order	Great soil group	Series
Zonal	Gray-Brown Podzolic	Alvin.
		Chaseburg.
		Chelsea.
		Downs.
		Dubuque.
		Fayette.
		Quandahl.
	Brunizem	Buckner.
		Dodgeville.
		Judson.
		Schapville.
		Tama.
		Volney.
		Waukegan.
Intrazonal	Planosol	Zwingle.
Azonal	Alluvial	Dorchester.
	Lithosol	Sogn.

Gray-Brown Podzolic soils

Soils of the Gray–Brown Podzolic great soil group make up the largest area in the county. They have developed under deciduous forest. They are zonal soils and have well-developed profiles, though not strongly developed. Their natural drainage in this county ranges from rapid to well drained.

The middle–of–the–range virgin Gray–Brown Podozolic soils have the following features: (1) an A_0 horizon of leaf litter and twigs; (2) a thin (2- to 6-inch) dark A_1 horizon; a weakly to strongly developed platy A_2 layer; and a yellowish-brown B horizon of blocky structure.

The Fayette are typical Gray-Brown Podzolic soils. The Downs grade toward the typical Brunizem in that they have a darker A_1 layer. The Alvin and Chelsea grade toward Regosols in that their parent materials are quite sandy and certain soil profile features of typical Gray-Brown Podzolic soil are less evident. Dubuque soils grade toward Regosols, whereas Chaseburg soils grade toward Alluvial soils.

Alvin sandy loam (slopes of about 2 percent):

A_1 0 to 4 inches, dark grayish-brown to grayish-brown (10YR 4/2 to 5/2, moist)[5] friable sandy loam of single-grain structure.

A_2 4 to 16 inches, pale-brown (10YR 6/3, moist) sandy loam of single-grain structure.

B_2 6 to 30 inches, yellowish-brown (10YR 5/4, moist) sandy clay loam of weak fine subangular blocky structure;[6] friable when moist.

C 30 inches+, very pale brown (10YR 7/4, moist) loose sand to fine sand.

Chaseburg silt loam (slopes of about 1 percent):

A_1 0 to 14 inches, light grayish-brown (10YR 5/2 moist) silt loam; fine weak granular to crumb structure; friable when moist.

A_3 14 to 30 inches, light brownish-gray (10YR 6/2, moist) silt loam with some flecks of gray; fine weak granular to crumb structure; friable when moist; may contain a few faint yellow-brown mottles.

C_1 30 inches +, light yellowish-brown (10YR 6/4, moist) silt loam, slightly mottled with gray; massive to very weak granular or crumb structure; friable when moist.

Chelsea loamy fine sand (slopes of about 3 percent):

A_1 0 to 2 inches, light grayish-brown (10YR 5/2, moist) loamy fine sand; single-grain structure; loose when moist.

A_2–A_3 2 to 12 inches, light brownish-gray (10YR 6/2, moist) loamy fine sand; single-grain structure; loose when moist.

B_1–C_1 12 to 36 inches, pale-brown to light yellowish-brown (10YR 6/3 to 6/4, moist) sand to loamy fine sand; single-grain structure; loose when moist.

Downs silt loam (slopes of about 3 percent):

A_1 0 to 6 inches, very dark gray (10YR 3/1, moist) silt loam; fine granular structure; friable when moist.

A_2 6 to 16 inches, dark grayish-brown (10YR 4/2, moist) silt loam with many gray flecks; weak irregular platy structure; friable when moist.

B_2 16 to 36 inches, yellowish-brown (10YR 5/4, moist) light silty clay loam with low-contrast mottles of gray in lower part; weak medium subangular blocky structure; friable to slightly firm when moist.

---

[5] Munsell color notations.

[6] Terms for soil structure take into account, in this order, the distinctness, the size, and the shape of the aggregates. If this sequence is kept in mind, long terms such as "weak fine subangular blocky" are readily understood.

C 36 inches +, yellowish-brown (10YR 5/6, moist) heavy silt loam; very weak granular to massive structure; friable when moist.

Dubuque silt loam (slopes of about 6 percent):

A_1 0 to 2 inches, very dark gray (10YR 3/1, moist) silt loam; weak fine crumb to granular structure; friable when moist.

A_2 2 to 8 inches, brown (10YR 5/3, moist) silt loam; moderate fine platy structure; friable when moist.

B_1 8 to 14 inches, yellow-brown (10YR 5/8, moist) heavy silt loam; moderate fine subangular blocky structure; friable when moist.

B_2 14 to 28 inches, yellowish-brown (10YR 5/8, moist) silty clay loam; strong medium subangular blocky structure; friable to slightly firm when moist; a few chert fragments in lower part of layer.

D_u 28 inches +, limestone bedrock or reddish-brown silty clay residuum derived from weathered bedrock.

Fayette silt loam (slopes of about 5 percent):

A_1 0 to 2 inches, very dark gray (10YR 3/1, moist) silt loam; weak fine crumb to granular structure; friable when moist.

A_2 2 to 8 inches, brown (10YR 5/3, moist) silt loam; moderate to strong fine platy structure; friable when moist.

B_1 8 to 14 inches, yellowish-brown (10YR 5/8, moist) heavy silt loam; moderate fine subangular blocky structure; friable when moist.

B_2 14 to 30 inches, yellowish-brown (10YR 5/6, moist) light silty clay loam; strong medium subangular blocky structure; surface of structural aggregates heavily flecked with gray; a few strong yellowish-brown, faintly contrasting mottles in lower part; friable to slightly firm when moist.

B_3 30 to 36 inches, yellowish-brown (10YR 5/8, moist) light silty clay loam to heavy silt loam; moderate medium subangular blocky structure; contains a few distinctly contrasting gray and strong yellowish-brown mottles; friable to very slightly firm when moist.

C 36 inches +, yellowish-brown to brownish-yellow (10YR 5/6 to 6/6, moist) heavy silt loam of coarse blocklike to massive structure; commonly contains distinct mottles of gray and strong yellowish brown.

Quandahl silt loam (slopes of about 12 percent):

A_1 0 to 6 inches, grayish-brown (10YR 5/2, moist) silt loam; weak fine crumb to granular structure; friable when moist; limestone fragments often present.

A_2 6 to 12 inches, light brownish-gray (10YR 6/2, moist) silt loam; weakly developed medium platy structure; friable when moist; limestone fragments often present.

B_1 12 to 24 inches, yellowish-brown (10YR 5/4, moist) light silty clay loam; weak medium subangular blocky structure; friable to very slightly firm when moist; many limestone fragments often present.

C 24 inches +, light yellowish-brown (10YR 6/4, moist) heavy silt loam; massive to weak granular structure; friable when moist; contains many fragments of limestone, or occasionally, of sandstone.

Brunizem soils

The Brunizems, formerly called Prairie soils, have developed under grass vegetation. They are the dark-colored, naturally well drained to imperfectly drained soils of the uplands. They are zonal soils. The Brunizems include many soils formed from loam or silt loam parent materials that can hold and supply water and plant nutrients for crops. These soils are very productive of corn and similar crops. Brunizem soils formed from coarse-textured materials are low in productivity because they are droughty.

The uneroded Tama series is a middle-of-the-range Brunizem; the Judson and Volney grade toward Alluvial soils; and the Dodgeville, Buckner, Schapville, and Waukegan grade toward the Regosols. Profile descriptions of some typical Brunizem soils follow.

Buckner loamy sand (slopes of about 3 percent):

A_1 0 to 18 inches, very dark gray to dark grayish-brown (10YR 3/1 to 3/2, moist) loamy sand; single-grain structure; loose when moist.

B_1 18 to 30 inches, dark grayish-brown (10YR 3/2, moist) loamy sand; single-grain structure; loose when moist.

B_3–C_1 30 inches+, dark yellowish-brown (10YR 4/4, moist) sand; single-grain structure; loose when moist.

Dodgeville silt loam (slopes of about 10 percent):

A_1 0 to 8 inches, very dark grayish brown (10YR 3/1, moist) silt loam; moderate medium crumb to granular structure; friable when moist.

A_3 8 to 14 inches, very dark grayish brown (10YR 3/2, moist) silt loam; moderate medium granular to crumb structure; friable when moist.

B_2 14 to 24 inches, dark yellowish-brown to yellowish-brown (10YR 4/4 to 5/4, moist) light silty clay loam; strong medium crumb to weak subangular blocky structure; friable to very slightly firm when moist.

D_u 24 inches+, limestone bedrock or a reddish-brown clay residuum.

Judson silt loam (slopes of about 2 percent):

A_1 0 to 20 inches, very dark gray (10YR 3/1, moist) silt loam; moderate fine granular structure; friable when moist.

A_3–B_1 20 to 36 inches, dark grayish-brown (10YR 4/2, moist) heavy silt loam; moderate medium crumb to very weak subangular blocky structure; friable when moist.

C_1 36 inches+, dark-brown (10YR 4/3, moist) silt loam; may show a few faint yellowish-brown mottles; friable when moist.

Tama silt loam (slopes of about 3 percent):

A_1 0 to 10 inches, very dark gray (10YR 3/1, moist) heavy silt loam; moderate medium granular to crumb structure; friable when moist.

A_3 10 to 16 inches, very dark grayish brown (10YR 3/2, moist) heavy silt loam; moderate medium granular to crumb structure; friable when moist.

B_2 16 to 30 inches, dark yellowish-brown to yellowish-brown (10YR 4/4 to 5/4, moist) light silty clay loam; strong medium crumb to weak subangular blocky structure; friable to very slightly firm when moist; contains a few faint mottles of gray and strong yellowish-brown in lower part.

C 30 inches+, yellowish-brown (10YR 5/6, moist) silt loam; ordinarily shows distinct splotches of gray and reddish brown; friable when moist.

Schapville silt loam (slopes of about 5 percent):

A_1 0 to 12 inches, very dark brown to very dark grayish brown (10YR 2/2 to 3/2, moist) silt loam; moderate medium granular structure, friable when moist.

B_2 10 to 22 inches, dark grayish-brown to dark-brown (10YR 4/2 to 4/3, moist) light silty clay loam; moderate coarse subangular blocky structure; friable to very slightly firm when moist.

C 22 inches +, olive-brown to light olive-brown (2.5Y 4/4 to 5/4, moist) clay shale.

Volney silt loam (slopes of about 3 percent):

A_1 0 to 20 inches, very dark brown (10YR 2/2, moist) loam; moderate medium crumb to granular structure; friable when moist; weakly to strongly calcareous; normally contains many fragments of limestone.

C 20 to 40 inches+, dark grayish-brown to dark-brown (10YR 4/2 to 4/3, moist) loam; moderate crumb to granular structure; friable when moist; weakly to strongly calcareous; normally contains many fragments of limestone.

Waukegan loam **(*shallow phase on slopes of about 2 percent*):**

A_1 0 to 12 inches, dark grayish-brown (10YR 3/2, moist) loam; moderate fine granular to crumb structure; friable when moist.

B_1 12 to 24 inches, brown (10YR 5/3, moist) loam to sandy loam; strong medium crumb to weak subangular blocky structure; friable when moist.

D 24 inches +, sand or sand and gravel, normally not calcareous.

Planosols

Planosols in Allamakee County have developed on terraces and uplands from loess or alluvium. Planosols have one or more compact layers of high clay content that interfere with drainage and permeability. Zwingle silt loam, 1 to 4 percent slopes, is the only Planosol mapped in this county.

Zwingle silt loam **(*slopes of about 2 percent*):**

A_1 0 to 6 inches, grayish-brown (10YR 5/2, moist) silt loam; weak medium crumb to granular structure; friable when moist.

A_2 6 to 12 inches, light-gray (10YR 7/2, moist) silt loam; weak medium platy structure; friable when moist.

B_2 12 to 25 inches, reddish-brown (2.5YR 4/4, moist) heavy clay; sometimes mottled with gray; massive; very firm when moist.

C 25 inches +, similar to the layer above but often grayer; below 50 inches may be sand.

Alluvial soils

Alluvial soils are on flood plains or first bottoms. They are frequently overflowed and flooded. The nature of the profile is largely determined by the kinds of sediment deposited; its characteristics are closely related to those of the parent material. Alluvial soils are azonal; that is, they are very young and do not have well-developed profiles. The Dorchester is the only Alluvial soil in this county.

Dorchester silt loam **(*slopes of about 1 percent*):**

A_1 0 to 40 inches, dark grayish-brown to very dark brown (10YR 3/2, moist) silt loam; usually contains a few faint yellowish-brown mottles; weak fine granular to crumb structure; friable when moist; weakly to strongly calcareous.

B_b 40 inches +, black (10YR 2/1, moist) heavy silt loam to light silty clay loam; fine granular structure; friable to slightly firm when moist; this is the upper part of a buried soil.

Lithosols

Lithosols are upland soils that have faint horizons. They have formed from sedimentary rocks and are commonly very stony. Because they are shallow to hard parent materials and are generally steep, they are not of much use for farming. They provide fair to good pasture in places. Lithosols are azonal soils and are often in forest. Sogn silt loam is the only Lithosol mapped in Allamakee County.

Sogn silt loam (slopes of about 5 percent):

A_1 0 to 6 inches, very dark brown (10YR 2/2, moist) silt loam; moderate fine crumb to granular structure; friable when moist.
A_3 6 to 10 inches, very dark grayish-brown to dark grayish-brown (10YR 3/2 to 4/2) heavy silt loam to light clay loam; weak fine angular blocky structure; friable when moist.
D_u 10 inches +, limestone bedrock or reddish-brown silty clay residuum.

Miscellaneous land types

Areas such as rocky slopes, coastal beach, and dune sand that have little true soil are not designated by series and type names but are given descriptive names. Mixed alluvium, Sandy escarpment, Silty escarpment, and the Steep rocky lands are miscellaneous land types in Allamakee County.

ADDITIONAL FACTS ABOUT ALLAMAKEE COUNTY

Allamakee County is located in the northeastern corner of Iowa. It is bordered on the east by the Mississippi River, on the north by the State of Minnesota, on the west by Winneshiek County, Iowa, and on the south by Clayton County, Iowa. The total area of the county is 639 square miles, or 408,960 acres, 91.2 percent of which was in farms in 1950. About 40 square miles is subject to flooding by the Mississippi River.

The county was established at its present size in 1847 from parts of Fayette and Clayton counties. Lansing was settled in 1848 and Waukon in 1849. Waukon was selected as the county seat. In 1950, it had a population of 3,158.

The Winnebago Indian Mission, established in 1834, was the first permanent settlement in Allamakee County. After the Indians were removed in 1848, settlers began moving into the county in increasing numbers. The population increased from 777 in 1850 to a high of 18,711 in 1900. The 1950 census reports a population of 16,351.

All of the larger towns are served by railroads. The Chicago, Milwaukee, St. Paul and Pacific Railroad generally parallels the Mississippi River along the eastern border of the State, with a branch to Waukon. Roads are predominantly crushed rock, although a few concrete and asphalt roads cross the county. The Upper Iowa River flows across the northern part of the State into the Mississippi River, and the Yellow River crosses the southern part.

Climate

The average annual temperature at Waukon over a 20-year period is 45.6° F. The average January temperature is 15.7°, and the average July temperature is 71.9°. At Waukon the total precipitation has ranged from 19.97 inches for the driest year to 45.25 inches for the wettest year. The average yearly rainfall is 33.71 inches.

An 8-year record kept at Lansing shows the average date of the last killing frost is April 30, and the average date for the first killing frost is September 27. The average frost-free season lasts 150 days at Lansing. Table 9 has been compiled from data taken at Waukon.

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

[Elevation, 1,275 feet]

Month	Temperature [1]	Precipitation [2]		
	Average	Average	Driest year (1939)	Wettest year (1881)
	° *F.*	*Inches*	*Inches*	*Inches*
December	21.5	1.30	0.21	0.62
January	15.7	1.15	1.05	1.13
February	17.7	1.32	2.48	3.56
Winter	18.3	3.77	3.74	5.31
March	31.3	1.85	.33	1.92
April	46.6	2.46	1.52	1.36
May	58.5	4.40	2.50	1.64
Spring	45.5	8.71	4.35	4.92
June	67.0	4.40	1.59	2.94
July	71.9	4.19	3.04	9.26
August	71.5	3.95	2.96	2.87
Summer	70.1	12.54	7.59	15.07
September	61.3	4.00	1.47	9.85
October	50.0	2.60	2.31	7.90
November	34.2	2.09	.51	2.20
Fall	48.5	8.69	4.29	19.95
Year	45.6	33.71	19.97	45.25

[1] Average temperature based on a 20-year record, in the period 1931 through 1954.

[2] Average precipitation based on a 20-year record, in the period 1931 through 1954; wettest and driest years based on a 36-year record, in the period 1858 through 1954.

Principal Crops

Allamakee is mainly an agricultural county. Corn is the principal crop harvested, but oats is also important. For the year 1949 the areas planted to different crops were as follows:

Crop	*Acres*
Corn harvested for grain	48,443
Oats (threshed or combined)	43,333
Hay (excluding soybean and sorghum hay)	47,774
Clover or timothy (cut for hay)	36,294
Alfalfa (cut for hay or for dehydrating)	11,070
Red clover seed harvested	4,565

Acreages of soybeans, wheat, barley, and rye are very small. On some of the sandy soils small acreages of melons and truck crops are grown. In 1950, 58,590 cattle and calves and 90,957 hogs and pigs were reported on Allamakee County farms. More than three-fourths of the farms were classified as livestock farms in the census of 1950.

In 1949 the total cropland harvested was 151,943 acres. The Steep rocky lands, sandy and droughty areas, and shallow soils unfit for crops make up the largest part of the 170,772 acres of land pastured.

Woodland [7]

Much of the wooded area of this county is on steep, rocky, or sandy soils, or on soils shallow to bedrock or subject to overflow. These soils furnish such poor pasture that they are best suited to timber (fig. 8). Any returns which are realized from woodland products therefore represent supplemental farm income. In addition to the poor lands on which timber is growing, some soils suitable for agriculture are used for timber. Under conditions prevailing at the time this survey was made, however, the cost of clearing many of the soils potentially suitable would have been so high that it was more economical to leave them in timber. Steep rocky lands are considerably more productive on the moist north slopes than on the south slopes that are subject to afternoon sun and the drying southerly winds.

In 1949, there were 113,942 acres of woodland in the county.

***Figure 8.*—Timber growing on Steep rocky lands—the best use for this kind of land.**

[7] Information regarding timber management and harvesting practices can be obtained from the Department of Forestry, Iowa State College of Agriculture and Mechanic Arts, Ames, Iowa.

To obtain the best returns from woodlands, timber should be managed as a crop. Young seed trees of species that command the greatest market value should be protected from fire, blights, and grazing animals. Where young stands of timber are thinned, deformed trees or species of less economic value can be culled. When growth of bigger trees in the stand slows down, they should be marketed so that the younger, more vigorous trees can use the soil and water.

Like corn or other agricultural crops, trees grow better on some soils than on others. Therefore, timbered soils should be rated in terms of their productivity for trees. The relative productivity of different soils can be judged by comparing the height of the dominant trees that are 50 years old. Foresters indicate the amount of tree growth in terms of *site index* much as farmers measure the yields of a cornfield in bushels per acre.

The average site index of black, red, and white oak is shown for different soils as follows:

Soil	*Site Index*
Chaseburg and Judson	64
Fayette	60
Quandahl	57
Dubuque	54
Mixed alluvium	52
Steep rocky lands (north slopes)	52
Chelsea	44
Steep rocky lands (south slopes)	37
Zwingle	36
Sogn	33

LITERATURE CITED

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

(2) Kay, G. F., AND OTHERS.
[1943] THE PLEISTOCENE GEOLOGY OF IOWA. Iowa Geol. Survey Spec. Rpt., 3 vols. in 1. 621 pp., illus. [Des Moines].

(3) Muckenhirm, R. J., AND OTHERS.
1955. CERTAIN FIELD DESCRIPTIONS AND ANALYTICAL DATA OF LOESS-DERIVED GRAY-BROWN PODZOLIC SOILS IN THE UPPER MISSISSIPPI RIVER VALLEY. Ill. Agr. Expt. Sta. Bul. 578: 80 pp., illus. (No. Cent. Region. Pub. 46. 1955).

(4) Ruhe, R. V.
1950. RECLASSIFICATION AND CORRELATION OF THE GLACIAL DRIFTS OF NORTHWESTERN IOWA. [Doctor's thesis. Iowa State College]; *abs. in* Geol. Soc. Amer. Bul. 61: 1500–1501.

(5) ———
1952. TOPOGRAPHIC DISCONTINUITIES OF THE DES MOINES LOBE. Amer. Jour. Sci. 250: 46–56, illus.

(6) ——— AND SCHOLTES, W. H.
1956. AGES AND DEVELOPMENT OF SOIL LANDSCAPES IN RELATION TO CLIMATE AND VEGETATIONAL CHANGES IN IOWA. Soil Sci. Soc. Amer. Proc. 20: 264–273, illus.

(7) Scholtes, W. H., Smith, G. D., AND Riecken, F. F.
1954. TAYLOR COUNTY, IOWA, SOILS. U. S. Dept. Agr., Soil Survey Ser. 1947, No. 1, 74 pp., illus.

(8) Simonson, R. W., Riecken, F. F., and Smith, G. D.
1952. UNDERSTANDING IOWA SOILS. 142 pp., illus. Dubuque, Iowa.

(9) Smith, G. D., Allaway, W. H., and Riecken, F. F.
1950. PRAIRIE SOILS OF THE UPPER MISSISSIPPI VALLEY. Adv. in Agron. 2: 157–205, illus.

(10) Trowbridge, A. C.
1921. THE EROSIONAL HISTORY OF THE DRIFTLESS AREA. Iowa Univ., Studies in Nat. Hist. 9, 127 pp., illus.

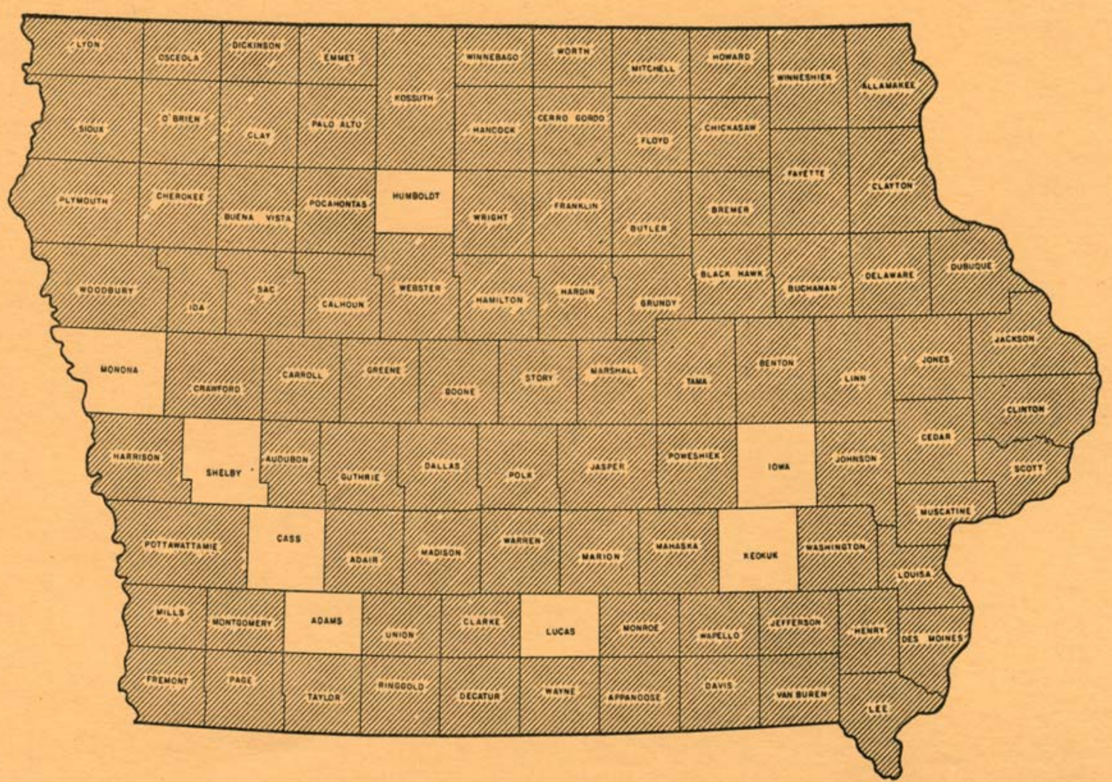
U. S. GOVERNMENT PRINTING OFFICE: 1958

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

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.



Areas surveyed in Iowa shown by shading.