Soil Productivity Indices and Soil Properties For Farm-Field Sites in Missouri

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On the Cover: Profile of Putnam soil series.

Soil Productivity Indices and Soil Properties For Farm-Field Sites in Missouri

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Soil Conservation Service
and
State of Missouri Department of
Natural Resources

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HOW TO USE THIS SPECIAL REPORT

1. See the key map in Figure 9, page 12. The map will identify by county and by Major Land Systems the location of sites for which soils information is available. Identify your area of possible interest.
2. See Table 1, pages 15 to 27 to identify fields or plots that may be of interest. Identify plots by county, field number and plot number. For example, the first plot listed in Table 1 should be identified as: Andrew 1978, 5-1.
3. Request data from those plots of interest. Send the request to: Department of Agronomy, University of Missouri, Columbia, Missouri 65211. Upon request, you will receive one data sheet for each plot that will be arranged as shown in Figure 8, page 9.
4. After receiving the data sheets, proceed as described in the section entitled, "How to Read and Interpret the Data Sheets" on pages 6 to 10.

INTRODUCTION

This report is designed to provide access to, and interpretation of, Missouri soil data generated in a study of 500 farm-field plots in 1978 and 1979. The objective of the study was to quantify the relationships between soil properties and soil productivity. The study procedure was to sample and characterize soils at randomly located plots in fields where corn or soybeans were being grown, and from that characterization, to estimate soil productivity. The results of the study were two-fold. First, soils information was generated. Second, a model called a soil productivity index was developed (Neill 1979, Kiniry et al. 1983) that converted soil properties into estimates of soil productivity.

This report supplements the soil property and soil productivity data that are available for each of the 500 sites. Those data are available as single computer-generated sheets for each site. Key maps and tables have been prepared so that potential users can identify those sites about which they desire information. Computer access to the data will be possible in the future. The procedures for identifying, ordering, and interpreting specific data sheets are outlined above under the heading "HOW TO USE THIS SPECIAL REPORT."

THE SOIL PRODUCTIVITY INDEX (PI)

The model for converting soil property data into estimates of soil productivity is based upon the assumption that soil is a determinant of crop yield because it provides an environment for root growth. Figure 1 from Neill (1979) shows the concept. For any combination of plant species, climate, and level of management, root growth and yield are determined by the soil environment as described in terms of five soil properties (Figure 1). Those soil properties are:

PAWC —Potential available water capacity, a property related to soil texture.

Bulk Density—A measure of aggregation, porosity, and root impedance.

pHs —A measure of soil acidity and indicator of aluminum toxicity to root growth.

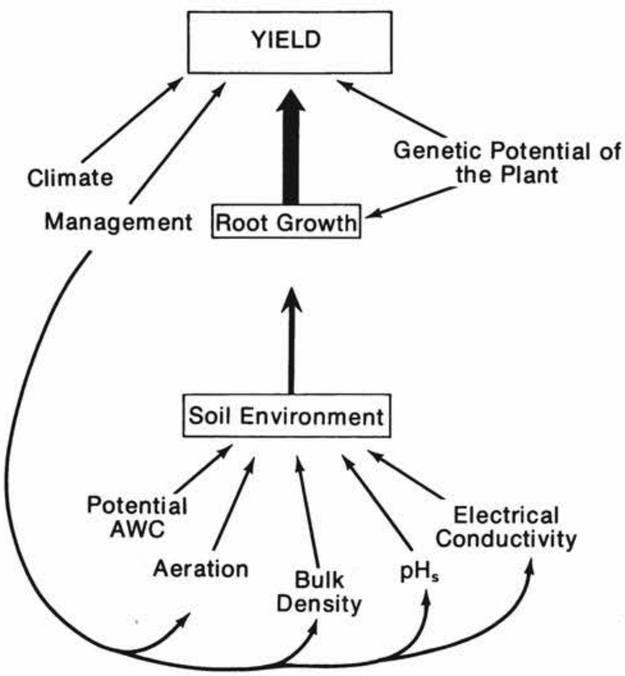


Fig. 1. Conceptual model for the study by Kiniry et al. (1983).

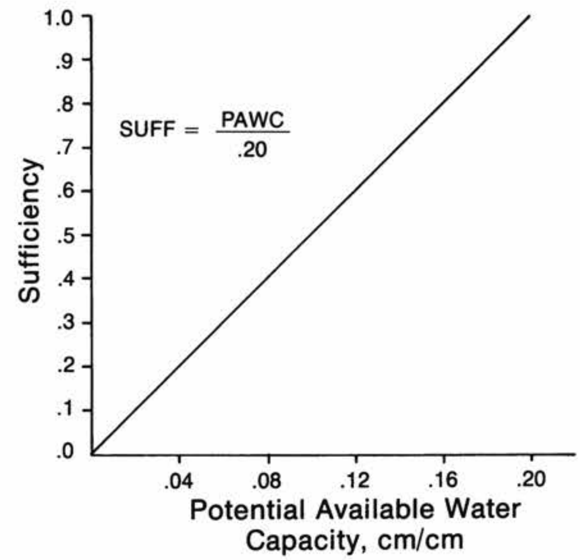


Fig. 2. Sufficiency of potential available water storage capacity (PAWC) used in calculation of the productivity index.

Aeration —A measure of oxygen movement to roots that is related to wetness. Evaluation of this property is incomplete and it is not used in sections that follow.

Electrical Conductivity—A measure of the salt content of the soil. Salt content is not a factor in most soils of Missouri.

Response curves and equations to convert soil property data into sufficiencies for root growth are shown in Figures 2, 3 and 4. A sufficiency of 1.0 corresponds to no root restriction and a sufficiency of 0.0 corresponds to total root restriction related to the soil property. The sufficiency values for each layer of soil are combined with a profile of root fractions expected in an ideal soil (RI) in a manner illustrated in Figures 5 and 6 (page 7). The combination, which is a multiplicative model, results in a productivity index with values between 0.0 and 1.0. The productivity indexes (PI) shown in Figures 5 and 6 represent profiles of predicted root fractions compared to that predicted in an ideal soil. The profiles of sufficiencies shown in Figures 5 and 6 can be used to identify layers that are limiting to rooting and productivity, as well as the magnitude of those limitations.

The profile of predicted roots in ideal soils (RI) is a weighting factor expressing the relative importance of each layer for root growth. The proper weighting is assumed to be plant-determined and was predicted by Kiniry et al. (1983) from the rooting depth (R) of the plant. Figure 7 (page 8) shows the prediction for R = 100 cm (39.4 inches). This value of R provided the best weighting in corn yield predictions by Pierce et al. (1983) and Larson et al. (1983) who tested the PI approach.

Nitrogen, phosphorus, potassium and micronutrients are not included in the PI. Proper fertility management can provide those elements. The PI models the potential productivity of the soil.

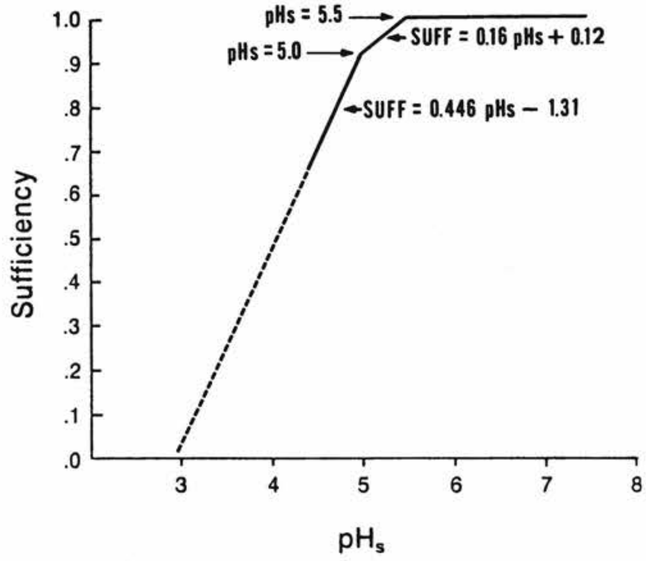


Fig. 3. Sufficiency of pHs used in calculation of the productivity index.

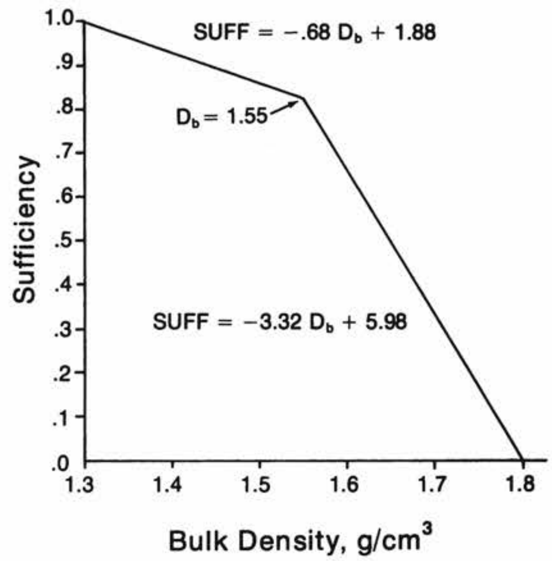


Fig. 4. Sufficiency of bulk density used in calculation of the productivity index.

SOIL PROPERTIES AND PRODUCTIVITY INDICES FOR SELECTED FIELD PLOTS IN MISSOURI

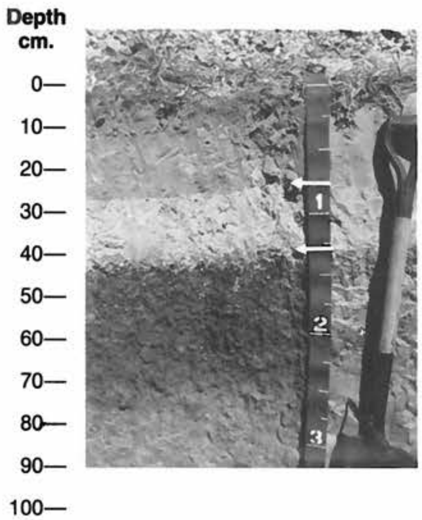
Soil property data and computed PIs are available for 500 plots in Missouri. Figure 8 (page 9) is a copy of the information for Plot 8 in Field 1 that was studied in 1978. The 500 plots were in 69 fields, the general locations of which are shown in the key map in Figure 9 (page 12). The example plot was in northern Dunklin County, a part of the Major Land System called the Southeastern Missouri Delta. Users of this report can identify the plots of interest by referring to Figure 9 and to Table 1 (page 15). Figure 9 locates each field used in corn and soybean yield studies. Each field had 6 to 15 plots where soil properties and PIs were determined.

HOW TO READ AND INTERPRET THE DATA SHEETS

The example data sheet shown in Figure 8 (page 9) contains five sections. Each section is explained in the paragraphs that follow.

Productivity Index and Predicted Root Fractions

This section is at the bottom of the data sheet. The sufficiencies of PAWC, salt pH, and bulk density for each 10 cm (4 inch) soil layer are shown in columns in the lower left portion of the table. The predicted root fractions in each layer of soil are obtained by multiplying (SUFF. PAWC) x (SUFF. SALT PH) x (SUFF. BULK DENS.) x (PRED. ROOT FRACTIONS IN IDEAL SOILS). The sum of the predicted root fractions in all 10 layers is the PI which is 0.675 for the example soil. The graph in the lower right portion shows the profile of predicted root fractions in this soil. By comparison with the ideal soil, the graph indicates where root restrictions exist.



(SUFF. PAWC)	x (SUFF. PHS)	x (SUFF. DENS.)	x (ROOT FRACT. IDEAL)	= (ROOT FRACT. THIS SOIL)
1.00	1.00	.98	.314	.308
1.00	1.00	.98	.196	.192
1.00	.88	1.00	.143	.126
1.00	.70	1.00	.108	.076
.30	.70	1.00	.082	.017
.30	.74	.99	.061	.013
.35	.88	.96	.044	.013
.55	.98	.90	.030	.015
.60	1.00	.89	.017	.009
.70	1.00	.89	.005	.003
			PI = 1.000	.772

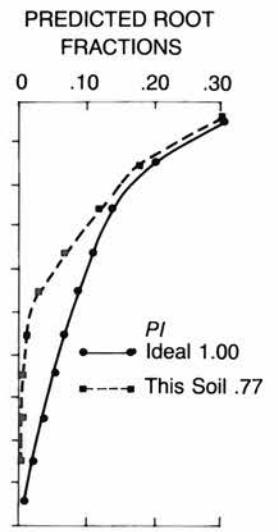
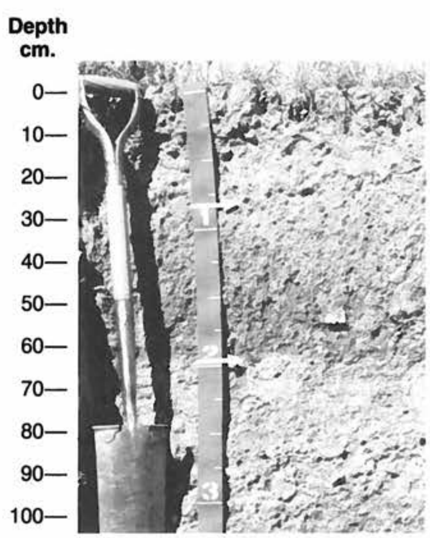


Fig. 5. The profile of soil sufficiencies and the method for conversion into a productivity index (PI) for the Putnam soil series.



(SUFF. PAWC)	x (SUFF. PHS)	x (SUFF. DENS.)	x (ROOT FRACT. IDEAL)	= (ROOT FRACT. THIS SOIL)
1.00	1.00	.96	.314	.301
1.00	1.00	.96	.196	.188
.75	.56	.92	.143	.055
.60	.43	.89	.108	.025
.35	.38	.98	.082	.011
.55	.34	.83	.061	.009
.75	.34	.30	.044	.003
.75	.34	.04	.030	.000
.60	.38	.04	.017	.000
.35	.38	.70	.005	.000
			PI = 1.000	.592

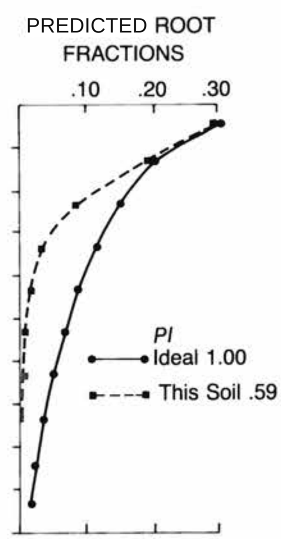


Fig. 6. The profile of soil sufficiencies and the method for conversion into a productivity index (PI) for the Creldon soil series.

The sufficiency columns show the magnitude of any restriction. In the example soil, pH is restrictive between the depths of 10 and 70 cm (4 and 28 inches). Density and PAWC are less restrictive. The possible effects of liming and plowing or chiseling to greater depths can be estimated (liming to remove pH restrictions and plowing to correct density restrictions). Liming of the 10-20 cm (4-8 inch) layer would increase the PI by 0.077 units. That increase is the difference between predicted rooting after modification and predicted rooting before modification (0.89 x 1.00 x 1.00 x 0.196) - (0.89 x 0.56 x 1.00 x 0.196). That increase in PI should amount to 7.7 percent of the yields on ideal soils. If 200 bushels of corn per acre is that maximum yield, the increase should be approximately 15 bu/A. Or, if the current average yield for the example plot is known, the increase should be the increase in PI (0.077) divided by the PI (0.675). The increase is 0.114 or 11.4 percent of the current average yield. Liming and plowing to 30 cm (12 inches) could raise the sufficiency of pH of two layers (10-20 cm and 20-30 cm) as well as raising the sufficiency of density in the 20-30 cm layer. The total increase in PI would be 0.077 + 0.065 = 0.142, and the estimated increase in corn yield would be 28 bu/A.

The sufficiency of PAWC, which is determined by soil texture, cannot be improved on this soil in which the better materials (highest sufficiencies) are at the surface. Some soils having the lowest sufficiencies of PAWC at the surface might be improved by techniques designed to move better materials from lower layers to the surface.

Soil Properties

This section is in the center of the data sheet. The properties were those used to calculate the PI.

The column labeled CLAY FRACTION shows the fraction of each layer that is clay-sized material. The remaining fraction of each layer is either silt or sand. The proportions of clay, silt and sand determine the textural class name that is coded in the second column. Table 2 lists those textural class names. The example soil has silt loam textures (SIL) in the upper layers and silty clay loam textures (SICL) in lower layers.

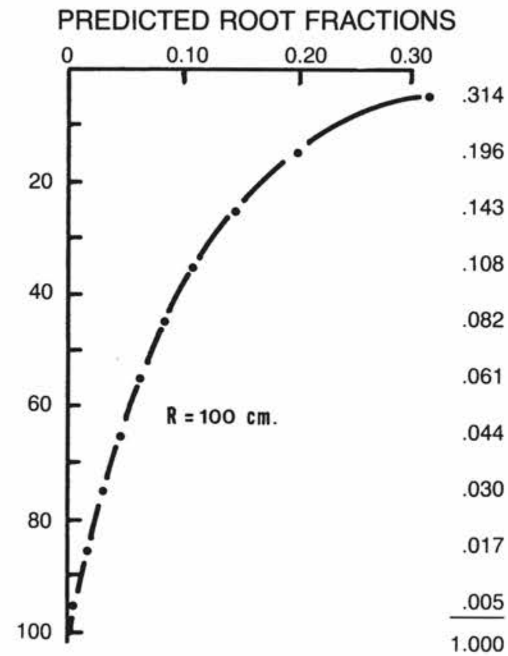


Fig. 7. Predicted profile of root fractions in ideal soils for a plant-determined rooting depth (R) of 100 cm. The predicted fractions constitute a weighting factor when used to calculate the productivity index (PI).

The column labeled BULK DENSITY shows measured values of bulk density that were used to calculate sufficiencies of bulk density (see Figure 4). Table 3 shows the sufficiency value for each value of bulk density. An exception was made for the top two layers in the example plot and all other plots. Those layers were assigned a sufficiency of 1.0 regardless of the measured bulk density because the predetermined sampling point was often in a tractor wheel track where compaction led to high density. In addition, one tillage could easily change the density. Users of this report may want to investigate the consequences of permitting compaction and high densities in the top two layers. Animal and machine traffic can easily create bulk densities of greater than 1.55 g/cm^3 or sufficiencies of less than 0.80.

The sufficiencies of bulk density shown in Table 3 are for silty and clayey materials. Sandy materials are less restrictive for any given value of bulk density. A possible correction for this has been provided by

Figure 8. Example of data for one site.

Missouri Soil Productivity Studies - 1978
Field Number 1, Plot 8

Landscape Position and Stratigraphy of Materials

Local Landform :Stream Terrace
Hillslope Position :Floodplain or Stream Terrace
Materials :Alluvium

Slope : 1%
Aspect : 270 Deg.

Class: Typic Albaqualf,
Fine-Silty Mixed Thermic

Soil Description for Field 1 Plot 8 1978

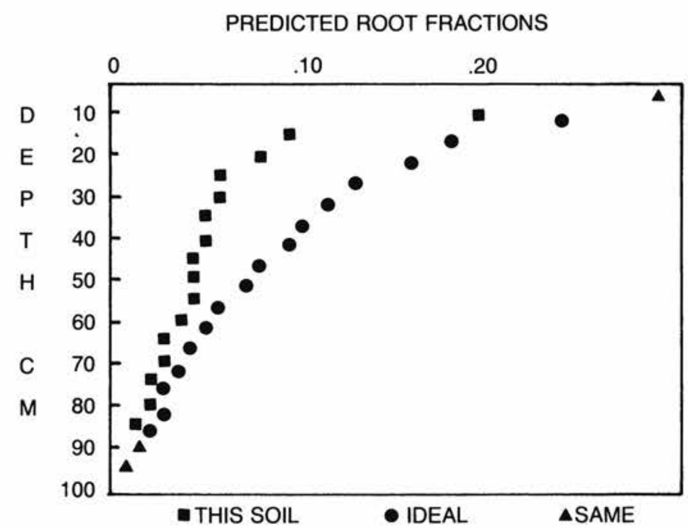
		Soil Color										Structure		
		Matrix		Mottle			Mottle							
Depth CMS	Horizon	Hue	V/C	Hue	V/C	Frac tion	Hue	V/C	Frac tion	Clay Fraction	Textural Class	Grade	Size	Type
0- 10	AP	10YR	5/4	–			–			0.12	SIL	1	VF	GR
10- 13	AP	10YR	5/4	–			–			0.12	SIL	1	VF	GR
13- 20	B21TG	10YR	5/2	7.5YR	5/6	0.40	–			0.26	SIL	2	F	SBK
20- 30	B22TG	10YR	4/2	7.5YR	5/6	0.30	–			0.26	SIL	1	M	SBK
30- 41	A'2G	10YR	6/2	7.5YR	4/4	0.20	–			0.28	SICL	1	F	SBK
41- 51	B'1G	10YR	6/2	10YR	5/4	0.30	–			0.28	SICL	1	F	SBK
51- 61	B'2TG	10YR	6/2	10YR	5/4	0.30	–			0.25	SIL	1	F	SBK
61- 71	B'2TG	10YR	6/3	–			–			0.29	SICL	0		M
71- 81	B'2TG	10YR	6/3	–			–			0.30	SICL	1	M	SBK
81- 91	B'2TG	10YR	6/3	–			–			0.30	SICL	1	M	SBK
91-102	B'2TG	10YR	6/3	7.5YR	6/6	0.30	–			0.26	SIL	1	M	SBK
102-112	B'2TG	10YR	6/3	7.5YR	6/6	0.30	–			0.26	SIL	1	F	SBK

Soil Properties for Field 1 Plot 8 1978

Depth CMS	Clay Fraction	Textural Class	Bulk Density G/CM3	PAWC CM/CM	AFP Fraction	Salt pH
0- 10	0.12	SIL	1.33	0.24	0.16	5.7
10- 20	0.26	SIL	1.34	0.18	0.12	4.2
20- 30	0.26	SIL	1.38	0.18	0.10	4.1
30- 40	0.28	SICL	1.38	0.17	0.10	4.2
40- 50	0.28	SICL	1.40	0.17	0.09	4.4
50- 60	0.25	SIL	1.41	0.18	0.09	4.8
60- 70	0.29	SICL	1.44	0.16	0.07	5.2
70- 80	0.30	SICL	1.43	0.16	0.07	5.6
80- 90	0.30	SICL	1.47	0.16	0.06	5.9
90-100	0.26	SIL	1.48	0.18	0.07	6.1
100-110	0.26	SIL			0.00	6.1

Productivity Index for Field 1 Plot 8 1978

	Fractions				
	Sufficiencies			Predicted Roots	
Depth CMS	PAWC	Salt pH	Bulk Density	Ideal (RI)	This Soil
0- 10	1.00	1.00	1.00	.314	.314
10- 20	0.89	0.56	1.00	.196	.098
20- 30	0.89	0.52	0.94	.143	.062
30- 40	0.84	0.56	0.94	.108	.048
40- 50	0.85	0.65	0.93	.082	.042
50- 60	0.91	0.83	0.92	.061	.042
60- 70	0.82	0.95	0.90	.044	.031
70- 80	0.81	1.00	0.91	.030	.022
80- 90	0.80	1.00	0.88	.017	.012
90-100	0.89	1.00	0.87	.005	.004
		Productivity Index Sums		1.000	0.675



LOCATION
DUNKLIN COUNTY; 5.2 MI W OF MALDEN
NE ¼ OF SEC. 28, T.23N R.9E
LAT. 36 DEG. 36 MIN. LONG. 90 DEG. 5 MIN.

Pierce et al. (1983) who modified the PI approach. That proposed modification is not included in this report, but users should be aware of it.

The column labeled PAWC contains values for the fractional volume of each layer containing water available to plants. Those fractional volumes are converted to sufficiencies of PAWC by the equation shown in Figure 2. Values of PAWC were determined by field measurement at planting time. The amount of water at that time was considered the upper limit of available water. Estimates of the lower limit were made from laboratory determinations of water retained at 15 bars pressure, which approximates the water content at which plants wilt. The difference between the upper limit and the lower limit is PAWC. Measurement of the upper limit at planting time led to underestimation of PAWC in some surface layers because those layers were partially dried before planting could be accomplished. Therefore, on many plots the value of PAWC in surface layers was estimated from clay content. The prediction equation from Kiniry et al. (1983) was PAWC = 0.286 - 0.418 x CLAY.

The column labeled AFP (air-filled porosity) shows the values for the fraction of the soil volume that contained air when the soil moisture was at the upper limit. Values below 0.10 indicate layers that were poorly aerated (wet) at sampling time.

Salt pH is the pH measured in a 1:1 mixture of soil and .01 M $CaCl_2$. It is the pH measured in Missouri soil testing procedures (Brown and Rodriguez, 1983). Values of salt pH were converted to sufficiencies as shown in Figure 3. Table 4 shows the sufficiency of salt pH for each value.

Soil Description

This section is near the top of each data sheet. It contains the descriptive information provided by soil scientists for each soil layer. Complete explanation of each portion will not be provided here. Interested readers may consult soil scientists with the USDA SCS, USDA Forest Service, or the University of Missouri. The section contains descriptions of horizon designations, soil color, soil texture and soil structure. All are described in detail in Soil Taxonomy (1975).

Horizon designations that start with A indicate surface soils, and those that start with B indicate subsoils.

Soil color is described by the Munsell system in terms of hue, value and chroma. For the example soil, the 0-10 cm layer has a color of 10YR5/4. The hue is 10YR, the value is 5, and the chroma is 4. Low chromas (2 or less) indicate a history of wetness or poor aeration. Soil colors are described for both the matrix (the predominant soil color) and for mottles (spots of different colors).

Structure is described in terms of grade, size and type. Figure 10 (page 13) illustrates the types of soil structure and provides the code for size and grade. Strong grade of structure (code 3) is the most desirable, and massive (code 0) is the least desirable for root and water penetration.

Landscape Position and Stratigraphy of Materials

This section is at the top of each data sheet. It describes the setting in which the plot was situated. Table 5 is a code sheet that indicates the possible combinations. Figure 11 (page 14) is a diagram of a hillslope landscape that shows the possible locations. Landscape position and stratigraphy of materials greatly influence the pathways of water that flow over or through the landscape. The PI does not take this factor into account because of the difficulty in providing a simple model.

Classification

This section is in the upper right portion of the data sheet. Each soil is classified by the system described in Soil Taxonomy (1975). The classification is based upon all of the soil properties. Soils that are classified alike are thought to function alike. The productivity indices are related to soil classification. Readers interested in a more complete discussion are encouraged to read Soil Taxonomy or consult a local soil scientist.

POTENTIAL USES OF THIS REPORT

This report provides access to a data set of measured soil properties that are related to soil productivity. It also provides a procedure for evaluating the soil's impact upon productivity. The mathematical model for determining PI is a simple one centered around sufficiency response curves and an assumed geometry of rooting in ideal soils (RI). The model is adaptable to on-site evaluation. This use constitutes its greatest potential. Other special uses include the assessment of soil modification effects such as deep liming, chiseling or mixing of soil materials, design of soil reconstitution in strip-mined lands, land evaluation, and assessment of erosion effects upon soil productivity.

Data Inputs for On-Site Evaluation

Individuals desiring to use the PI approach for on-site evaluations will need values of pH, density and PAWC for each site. If measured values are not feasible, then a modern soil survey report will be very useful. Values of pH and PAWC are available for each soil survey map unit. The pH values are pHw (pH in 1:1 soil and water). For Missouri soils pHs is usually about 0.5 units lower than pHw. Missouri's soil testing procedure determines pHs. This is the recommended procedure for on-site evaluations.

Bulk density values are not available in most soil survey reports. However, if the soil series can be identified, an individual can request the USDA SCS form 5 for that series from the local SCS office. The forms are interpretation sheets that include all of the input data needed to calculate PI. Input values are given in ranges, and the user may need to choose the median of that range.

The data sheets from this special report can be used to estimate input values; however, on-site evaluation is preferable.

Assessment of the Effects of Soil Modifications Including Soil Erosion

The PI approach quantifies the potential productivity of the soil, which can be changed by special modification. If density or poor aggregation is a problem, then tillage methods, cropping systems or organic matter additions to promote aggregation could change the potential. If acidity or low pHs is the problem, then liming could change the potential. If low PAWC is a problem, modifications may be difficult. However, if materials with high PAWC are in the profile, then methods of mixing that place the best materials at the surface may be feasible.

Individuals can determine the effects of any modification upon PI. New values for pHs, density or PAWC that result from modification can be used to determine new sufficiencies. A new PI can then be calculated.

Soil erosion is a form of soil modification that normally results in reduced soil productivity. In most erodible soils, the best materials (highest sufficiencies) are at the surface. When erosion is permitted, the less desirable (lower sufficiency) subsoil layers are positioned nearer to the surface. The result is a lowered PI. Individuals can calculate the magnitude of the reduction once the profile of input data is determined. For example, the soils shown in Figures 5 and 6 can be computer-eroded by assuming that the top 10 cm (4 inches) is lost. The surface then becomes the top of the 10-20 cm (4-8 inch) layer. One erases the sufficiencies in the 0-10 cm section and moves all of the sufficiency values up one space. The column labeled "ROOT FRACT. IDEAL" remains the same and a new "ROOT FRACT. THIS SOIL" is calculated by multiplying by the new sufficiencies. No sufficiency data will be available for the new 90-100 cm depths. For calculation purposes, assume that they are the same as for the layer immediately above.

By inspection of the sufficiency columns in Figures 5 and 6, one can see that each loss of 10 cm will move lower sufficiency materials nearer the immediate surface, where the greatest ROOT FRACT. IDEAL is located (.314). The result will be a reduced PI.

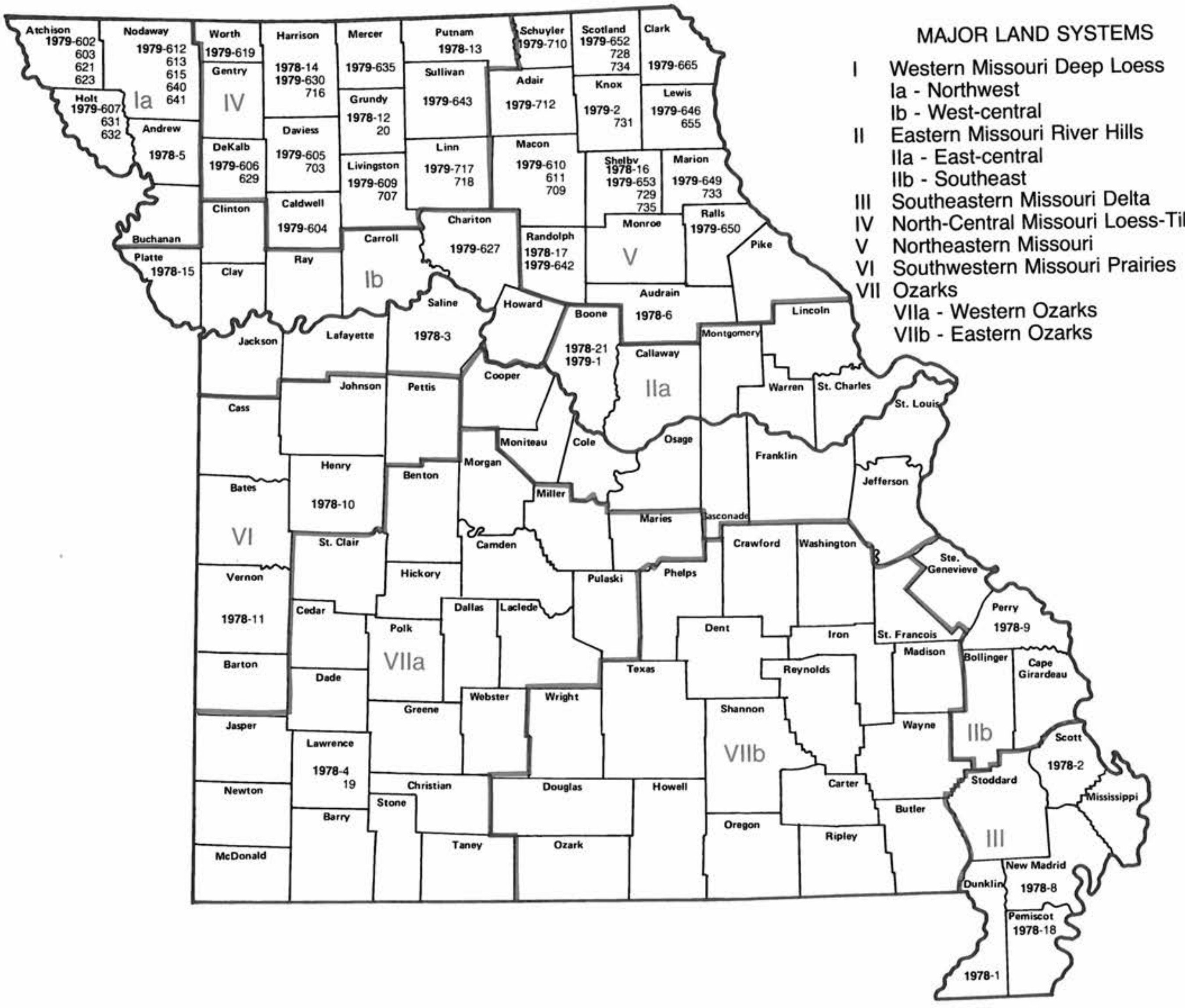


Figure 9. Key map showing the location of each field studied by county and major land system. Fields are identified by year and field number. For further reference see Table 1.

When the PI's are calculated, the effects of erosion on the two soils shown in Figures 5 and 6 (Putnam and Creldon series) are:

SOIL LOSS		**PI**	
(cm)	*(inches)*	Not Limed Not Tilled	Limed Tilled to 20 cm depth
Putnam Series			
0	0	.772	.782
10	4	.690	.720
20	8	.577	.674
30	12	.457	.569
Creldon Series			
0	0	.592	.613
10	4	.444	.528
20	8	.214	.402
30	12	.139	.298

Two values of PI are shown to illustrate the relationship between productivity index and management. The left-hand column shows the dramatic reduction in PI as the two soils erode. The right-hand column shows the reduction in PI as two soils erode; however, in this case it was assumed that the surface 0-20 cm or 0-8 inches were limed according to soil tests so that the sufficiency of pHs was 1.00. It was also assumed that tillage practices were good enough to raise the sufficiency of density to 1.00 in the managed surface layer. A reduction in PI is predicted, but it is not as great as in poorly managed soils.

The PI approach has been used to quantify the effects of erosion for large areas (Larson et al. 1983, Pierce et al. 1983, Rijsberman and Wolman, eds. 1984). Such use differs from the on-site approach described in this special report. However, the conclusion that might be drawn is that the approach, with some modifications, has promise.

Individuals can make estimates similar to those made for the Putnam and Creldon soils. Soil tests can be used to predict the amount of lime needed, and tillage costs can be estimated. From those data, a cost-benefit analysis of management can be made.

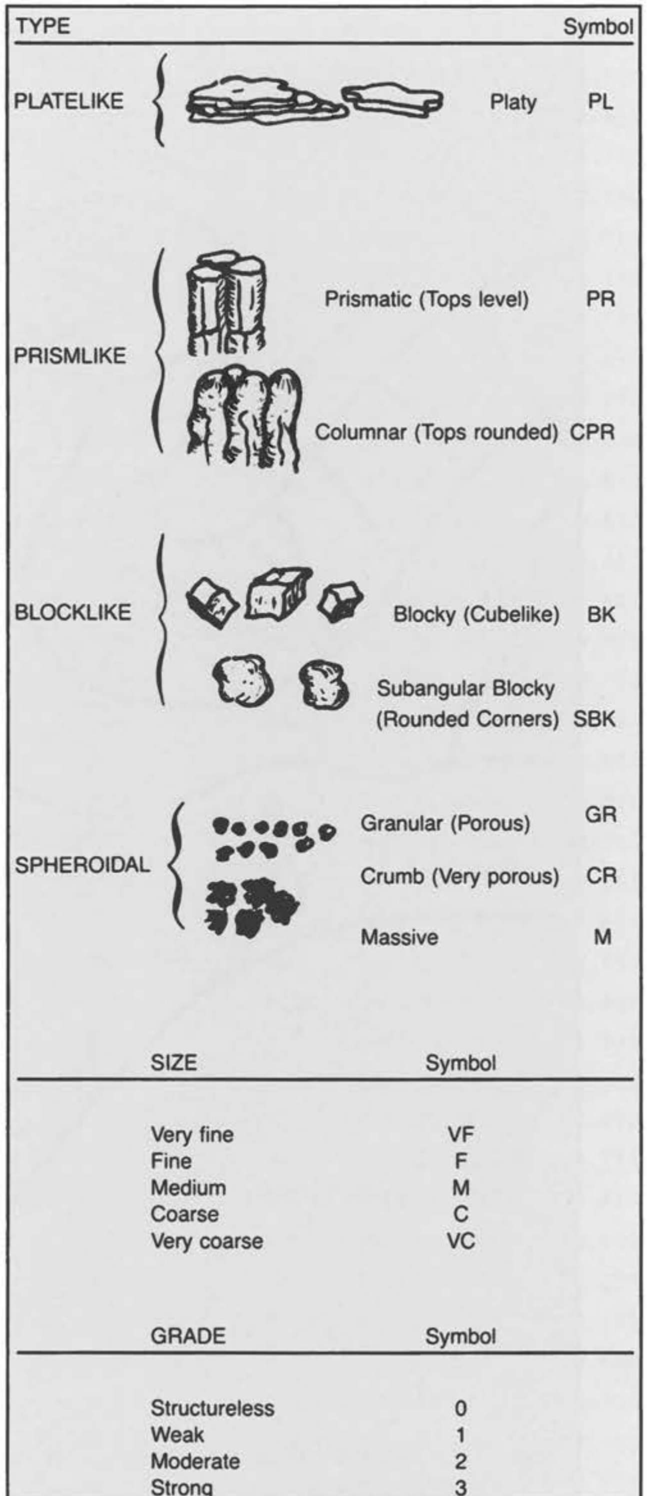


Fig. 10. Types, sizes and grades of soil structure.

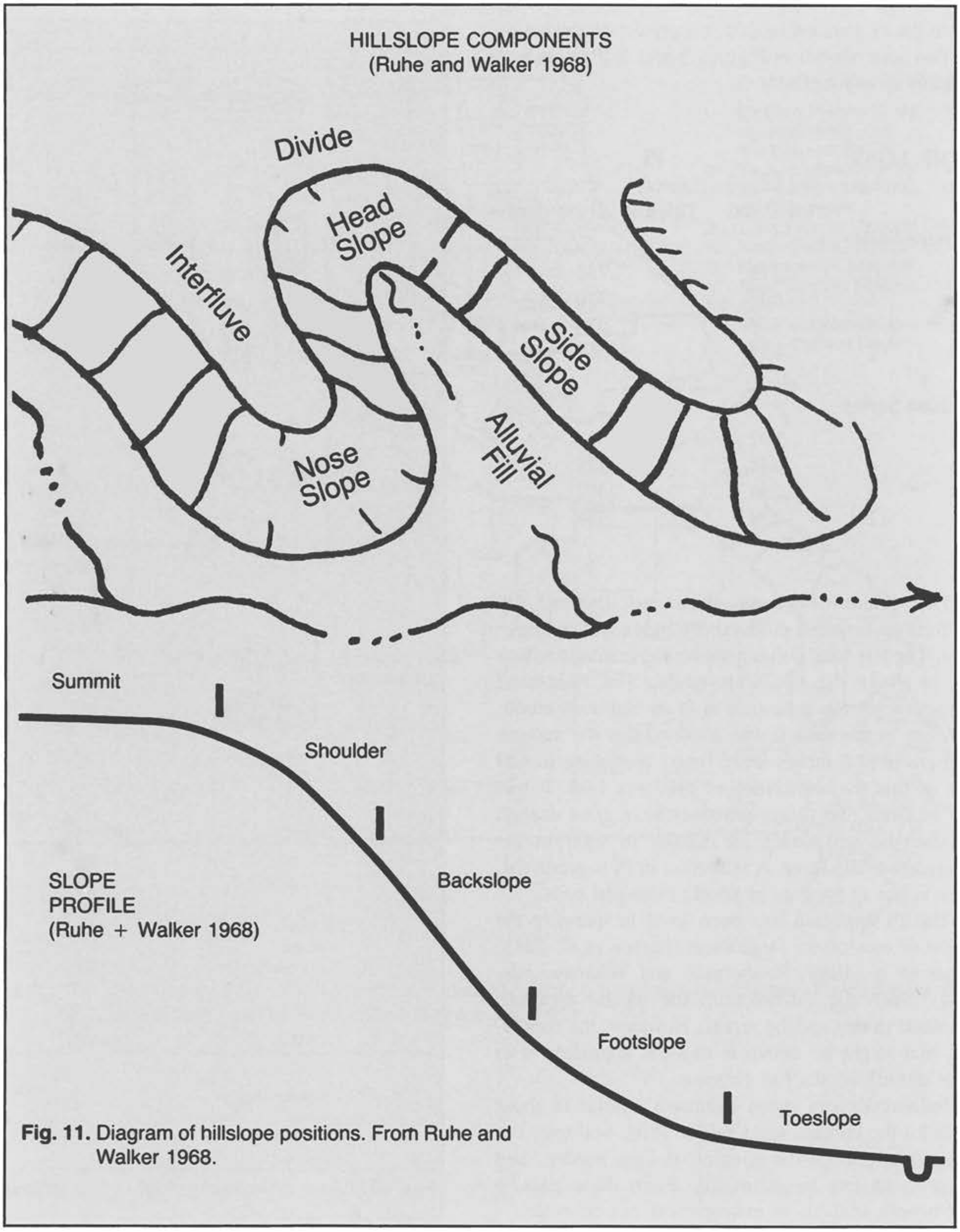


Fig. 11. Diagram of hillslope positions. From Ruhe and Walker 1968.

Table 1. Index to location and identification of all fields and plots for which data are available.

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
Ia Northwest Missouri Deep Loess	Andrew	1978-5	1	22	W2/T	4	ARGIUDOLL	0.818
			2	11	W2/T	1	ARGIUDOLL	0.936
			3	23	W2/T	5	HAPLUDALF	0.709
			4	24	W1/T	9	ARGIUDOLL	0.570
			5	43	W1/T	8	ARGIUDOLL	0.722
			6	32	W2/T	4.5	ARGIUDOLL	0.729
			7	33	W2/T	10	ARGIUDOLL	0.774
			8	43	W2/T	11	HAPLUDALF	0.695
			9	12	W2/T	3.5	HAPLUDALF	0.792
			10	42	W2/T	9	HAPLUDALF	0.818
			11	33	W2/T	7	ARGIUDOLL	0.843
			12	33	W2/T	3.5	ARGIUDOLL	0.813
	Atchison	1979-602	1	45	V/W	1	HAPLAQUOLL	0.905
			2	44	V/W	1	HAPLAQUOLL	0.807
			3	44	V/W	4	HAPLAQUOLL	0.765
			4	43	W2/T	13	UDORTHENT	0.719
			5	44	V/W	2	HAPLAQUOLL	0.864
			6	45	A	1	HAPLAQUOLL	0.809
		1979-603	1	44	V/W	2	UDIFLUVENT	0.937
			2	33	W2/T	7	HAPLUDOLL	0.793
			3	44	V/W	2	HAPLUDOLL	0.903
			4	43	T	14.5	UDORTHENT	0.614
			5	32	T	12	HAPLUDALF	0.650
			6	44	V/W	1.5	HAPLUDOLL	0.858
		1979-621	1	34	V/W	5	HAPLAQUOLL	0.775
			2	32	W2/T	8	HAPLADALF	0.654
			3	11	W2/T	2	HAPLUDALF	0.602
			4	43	W2/T	7	ARGIUDOLL	0.773
			5	43	W2/T	7	HAPLUDALF	0.617
			6	11	W2/T	2	HAPLUDALF	0.605
		1979-623	1	00	A	1	UDIFLUVENT	0.798
			2	00	A	0.3	UDIFLUVENT	0.782
			3	00	A	0.3	UDIFLUVENT	0.872
			4	00	A	0.3	UDORTHENT	0.926
			5	.00	A	0.3	UDIFLUVENT	0.915
			6	00	A	0.3	UDIFLUVENT	0.758
	Holt	1979-607	1	00	A	0	HAPLAQUOLL	0.474
			2	00	A	0	UDIFLUVENT	0.567
			3	00	A	0	UDIFLUVENT	0.690
			4	00	A	0	UDIFLUVENT	0.843
			5	00	A	0	UDIFLUVENT	0.550

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
			6	00	A	0	UDIFLUVENT	0.479
		1979-631	1	00	A	0.3	UDIFLUVENT	0.791
			2	00	A	0.3	UDIFLUVENT	0.828
			3	00	A	0.3	UDIFLUVENT	0.785
			4	00	A	0.3	UDIFLUVENT	0.723
			5	00	A	0.3	UDIFLUVENT	0.780
			6	00	A	0.3	UDIFLUVENT	0.833
		1979-632	1	00	A	0.5	HAPLAQUOLL	0.930
			2	00	A	0.5	HAPLAQUOLL	0.614
			3	00	A	0.5	HAPLAQUOLL	0.697
			4	00	A	0.5	HAPLAQUOLL	0.629
			5	00	A	0.5	HAPLAQUOLL	0.742
			6	00	A	0.5	HAPLAQUOLL	0.678
	Nodaway	1979-612	1	00	A	1	ARGIAQUOLL	0.575
			2	00	A	0.2	HAPLAQUOLL	0.827
			3	11	W1/T	0.5	ARGIUDOLL	0.658
			4	11	W2/T	0.7	ARGIUDOLL	0.589
			6	00	A	1	ARGIAQUOLL	0.554
		1979-613	2	33	W2/T	7	HAPLUDALF	0.709
			3	23	W2/T	6	ARGIAQUOLL	0.794
			4	33	W2/T	6	HAPLUDOLL	0.654
			5	33	W2/T	7	HAPLUDALF	0.652
			6	33	W2/T	7	HAPLUDOLL	0.649
		1979-615	1	33	W0/T	7	OCHRAQUALF	0.515
			2	33	W0/T	7	HAPLUDALF	0.616
			3	33	W1/T	4	ARGIAQUOLL	0.684
			4	34	W0/T	4.5	HAPLUDOLL	0.747
			5	33	W0/T	7	ARGIAQUOLL	0.643
			6	33	W0/T	7	ARGIAQUOLL	0.675
		1979-640	1	11	W1/T	0.5	ARGIAQUOLL	0.621
			2	23	W1/T	8	HAPLAQUOLL	0.714
			3	44	W1/T	4.5	ARGIAQUOLL	0.742
			4	33	W1/T	5	OCHRAQUALF	0.831
			5	22	W1/T	7	OCHRAQUALF	0.851
			6	·33	W1/T	5	OCHRAQUALF	0.593
		1979-641	1	34	W1/T	3	HAPLAQUOLL	0.899
			2	34	W0/T	6	ARGIAQUOLL	0.664
			3	42	W1/T	6	ARGIUDOLL	0.658
			4	34	W0/T	2	ARGIAQUOLL	0.662
			5	32	W0/T	6	OCHRAQUALF	0.672
			6	25	V	3	HAPLAQUOLL	0.790

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
Ib West-Central Missouri Deep Loess	Chariton	1979-627	1	23	W0/T	5	ALBAQUALF	0.666
			2	22	W0/T	7	HAPLUDALF	0.596
			3	33	W0/T	3	OCHRAQUALF	0.542
			4	11	W1/T	2	ARGIUDOLL	0.753
			5	34	W0/T	7	OCHRAQUALF	0.707
	Platte	1978-15	1	33	W2/T	6	ARGIUDOLL	0.783
			2	32	W2/T	5	ARGIUDOLL	0.697
			3	33	W2/T	6	ARGIUDOLL	0.746
			4	33	W2/T	4	ARGIUDOLL	0.669
			5	34	W2/T	5	ARGIUDOLL	0.825
			6	12	W2/T	2	ARGIUDOLL	0.705
			7	12	W2/T	1	ARGIUDOLL	0.833
			8	43	W2/T	11	ARGIUDOLL	0.585
	Saline	1978-3	1	11	W3	0.3	ARGIUDOLL	0.923
			2	11	W3	1.8	HAPLAQUOLL	0.926
			3	11	W3	0.3	ARGIUDOLL	0.904
			4	11	W3	0.2	ARGIUDOLL	0.901
			5	12	W3	2	ARGIUDOLL	0.949
			6	23	W3	2	HAPLAQUOLL	0.875
			7	32	W3	1.5		0.942
			8	11	W3	0.2	ARGIAQUOLL	0.855
			9	11	W3	0.2	ARGIAQUOLL	0.947
			10	23	W3	2.5		0.920
			11	22	W3	0.5	ARGIUDOLL	0.939
			12	23	W3	1.5	ARGIUDOLL	0.930
IIa East-Central Missouri River Hills	Boone	1978-21	1	12	W1/T	1	ALBAQUALF	0.703
			2	12	W1/T	0.5	ALBAQUALF	0.730
			3	11	W1/T	1	ALBAQUALF	0.783
			4	12	W1/T	0.8	ALBAQUALF	0.705
			5	12	W1/T	1	ALBAQUALF	0.692
			6	12	W1/T	1	HAPLUDALF	0.785
			7	12	W1/T	1.5	ALBAQUALF	0.708
			8	12	W1/T	1	ALBAQUALF	0.682
			9	12	W1/T	1	ALBAQUALF	0.613
			10	12	W1/T	1	ALBAQUALF	0.656
			11	11	W1/T	0.3	ALBAQUALF	0.766
			12	12	W1/T	1	ALBAQUALF	0.713
			13	12	W1/T	0.8	ALBAQUALF	0.730
			14	12	W1/T	0.8	ALBAQUALF	0.704
			15	12	W1/T	0.5	ALBAQUALF	0.707
		1979-1	1	11	W1/T	0.1	ALBAQUALF	0.668

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
			2	11	W1/T	0.1	ALBAQUALF	0.754
			3	11	W1/T	0.1	HAPLUDALF	0.721
			4	11	W1/T	0.1	ALBAQUALF	0.740
			5	11	W1/T	0.1	ALBAQUALF	0.713
			6	11	W1/T	0.1	ALBAQUALF	0.594
IIb Southeast Missouri River Hills	Perry	1978-9	1	44	W1/X	8	HAPLUDALF	0.776
			2	34	W0/X	10	HAPLUDALF	0.723
			3	33	W0/X	10	HAPLUDALF	0.548
			4	11	W1/X	3.5	HAPLUDALF	0.742
			5	12	W1/X	5.5	HAPLUDALF	0.866
			6	32	W0/X	9	HAPLUDALF	0.565
			7	43	W1/X	9	HAPLUDALF	0.573
			8	42	W1/X	10	HAPLUDALF	0.754
III Southeastern Missouri Delta	Dunklin	1978-1	1	00	A	1	OCHRAQUALF	0.786
			2	00	A	1	ALBAQUALF	0.633
			3	00	A	1	ALBAQUALF	0.864
			4	00	A	1	ALBAQUALF	0.750
			5	00	A	1	ALBAQUALF	0.697
			6	00	A	1	UDIFLUVENT	0.959
			7	00	A	1	HAPLUDALF	0.775
			8	00	A	1	ALBAQUALF	0.675
			9	00	A	1	HAPLUDALF	0.729
			10	00	A	1	OCHRAQUALF	0.705
			11	00	A	1	HAPLUDALF	0.737
			12	00	A	1	HAPLUDALF	0.653
	New Madrid	1978-8	1	00	A	0.3	HAPLUDALF	0.542
			2	00	A	0.3	UDIFLUVENT	0.492
			3	00	A	0.3	HAPLUDALF	0.647
			4	00	A	0.3	HAPLUDALF	0.596
			5	00	A	0.3	UDIPSAMMENT	0.619
			6	00	A	0.3	HAPLUDALF	0.598
			7	00	A	0.3		0.763
			8	00	A	0.3	HAPLUDALF	0.601
	Pemiscot	1978-18	1	00	A	0.1	UDIFLUVENT	0.962
			2	00	A	0.1	HAPLAQUOLL	0.854
			3	00	A	0.1	HAPLUDALF	0.789
			4	00	A	0.1	ARGIUDOLL	0.906
			5	00	A	0.1	ARGIAQUOLL	0.924
			6	00	A	0.1	UDIFLUVENT	0.920
			7	00	A	0.1	ALBAQUALF	0.878
			8	00	A	0.1	ARGIAQUOLL	0.722

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
			9	00	A	0.1	HAPLUDALF	0.803
			11	00	A	0.1	HAPLUDALF	0.782
			12	00	A	0.1	HAPLUDOLL	0.937
			13	00	A	0.1	HAPLUDALF	0.893
			14	00	A	0.1	UDIFLUVENT	0.894
			15	00	A	0.1	UDIFLUVENT	0.968
	Scott	1978-2	1	00	A	0.5	HAPLUDALF	0.890
			2	00	A	0.5	HAPLUDALF	0.853
			3	00	A	0.5	HAPLUDALF	0.938
			4	00	A	0.5	HAPLUDALF	0.943
			5	00	A	0.5	HAPLUDALF	0.925
			6	00	A	1	HAPLUDALF	0.925
			7	00	A	0.5	ARGIUDOLL	0.904
			8	00	A	0.5	HAPLUDALF	0.945
			9	00	A	0.5	ARGIUDOLL	0.936
			10	00	A	1	HAPLUDALF	0.949
			11	00	A	0.5	ARGIUDOLL	0.942
			12	00	A	0.5	HAPLUDALF	0.903
IV North-Central Missouri Loess Over Till	Caldwell	1979-604	1	12	W1/T	2	ARGIAQUOLL	0.849
			2	12	W1/T	2	OCHRAQUALF	0.731
			3	11	W1/T	1	ARGIUDOLL	0.665
			4	11	W1/T	1	OCHRAQUALF	0.752
			5	12	W1/T	2	ARGIUDOLL	0.795
			6	22	W0/T	3	ARGIUDOLL	0.750
	Daviess	1979-605	1	00	A	0.5	UDIFLUVENT	0.851
			2	00	A	0.5	UDIFLUVENT	0.823
			3	00	A	0.5	UDIFLUVENT	0.915
			4	00	A	1	HAPLUDOLL	0.841
			5	00	A	2	UDIFLUVENT	0.836
			6	00	A	10	UDIFLUVENT	0.796
		1979-703	1	00	A	1	ARGIALBOLL	0.968
			2	00	A	4	OCHRAQUALF	0.516
			3	00	A	2	HAPLUDALF	0.590
			4	00	V	3	FLUVAQUENT	0.844
			5	00	V	3	FLUVAQUENT	0.965
			6	00	V	1	OCHRAQUALF	0.735
	Dekalb	1978-7	1	33	T	10	ARGIUDOLL	0.622
			2	34	T	5	HAPLAQUOLL	0.687
			3	44	A/T	1	HAPLAQUOLL	0.664
			4	44	T	6	HAPLAQUOLL	0.676

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
			6	44	A/T	1	HAPLAQUOLL	0.623
			7	11	T	0.2	OCHRAQUALF	0.647
			8	44	A/T	4	HAPLAQUOLL	0.641
			9	34	T	15	ARGIUDOLL	0.787
			10	33	T	11	ARGIUDOLL	0.711
			11	33	T	9	ARGIUDOLL	0.690
			12	45	A/T	1	HAPLAQUOLL	0.701
		1979-606	1	33	W1/T	6	ARGIUDOLL	0.715
			2	32	T	5	HAPLUDALF	0.704
			3	33	W1/T	6	HAPLUDALF	0.527
			4	33	W1/T	5	OCHRAQUALF	0.361
			5	33	W0/T	6	ARGIUDOLL	0.673
			6	33	W0/T	7	HAPLUDALF	0.724
		1979-629	1	00	A	1	HAPLAQUOLL	0.558
			2	12	W1/T	4	ARGIUDOLL	0.631
			3	34	T	6	ARGIUDOLL	0.921
			4	00	A	2	HAPLAQUOLL	0.693
			5	33	T	7	HAPLUDALF	0.600
			6	33	W0/T	6	ARGIUDOLL	0.498
	Grundy	1978-12	1	44	W0/T	4	ARGIUDOLL	0.686
			2	00	W1/A	0.5	ARGIUDOLL	0.954
			3	12	W1/T	5	ARGIUDOLL	0.855
			4	43	W0/T	6	ARGIUDOLL	0.837
			5	32	W1/T	0.1	ARGIALBOLL	0.770
			6	33	W0/T	3	OCHRAQUALF	0.597
			7	43	W0/T	5.5	ARGIUDOLL	0.660
			8	12	W0/T	0.3	OCHRAQUALF	0.610
		1978-20	1	43	W1/T	2	ARGIALBOLL	0.901
			2	43	W0/T	2.5	ARGIAQUOLL	0.871
			3	43	W1/T	2.5	ARGIUDOLL	0.781
			4	44	W0/T	0.7	OCHRAQUALF	0.866
			5	42	W0/T	2	ARGIAQUOLL	0.698
			6	43	W0/T	3.5	ARGIALBOLL	0.814
			7	44	W1/T	1.2	ARGIAQUOLL	0.795
			8	43	W1/T	3.5	ARGIAQUOLL	0.789
			9	42	W1/T	2.2	ARGIAQUOLL	0.844
			10	43	W0/T	2.5	ARGIALBOLL	0.885
			11	42	W0/T	2.5	ARGIAQUOLL	0.814
			12	43	W0/T	1.5	ARGIAQUOLL	0.773
			13	43	W1/T	3.5	ARGIAQUOLL	0.817
			14	43	W0/T	1.5	ARGIAQUOLL	0.859

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
			15	43	W1/T	2	ARGIUDOLL	0.793
	Harrison	1978-14	1	33	T	18	OCHRAQUALF	0.620
			2	33	W0/T	6	ARGIUDOLL	0.890
			3	33	W0/T	10.5	HAPLUDALF	0.785
			4	33	W0/T	10	ARGIUDOLL	0.696
			5	33	W0/T	5	ARGIUDOLL	0.725
			6	12	W0/T	6	ARGIUDOLL	0.822
			7	34	T	1.5	OCHRAQUALF	0.755
			8	33	W0/T	7	OCHRAQUALF	0.692
		1979-630	2	34	W0/T	2	OCHRAQUALF	0.726
			3	33	W0/T	9	HAPLUDALF	0.516
			4	33	W0/T	7	OCHRAQUALF	0.604
			5	34	W0/T	5	ARGIAQUOLL	0.938
			6	33	W0/T	8	ARGIAQUOLL	0.682
		1979-716	1	12	W0/T	2	ARGIUDOLL	0.747
			2	34	W0/T	6	ARGIUDOLL	0.741
			3	43	W0/T	4	OCHRAQUALF	0.695
			4	22	W1/T	4	OCHRAQUALF	0.711
			5	33	W0/T	7	ARGIUDOLL	0.744
			6	33	W0/T	4	ARGIAQUOLL	0.749
	Linn	1979-717	1	00	A	1	OCHRAQUALF	0.636
			2	00	A	1	HAPLAQUOLL	0.643
			3	00	A	1	HAPLAQUOLL	0.527
			4	00	A	1	OCHRAQUALF	0.697
			5	00	A	1	HAPLAQUOLL	0.624
			6	00	A	1	HAPLAQUEPT	0.858
		1979-718	1	00	A	0.5	HAPLAQUEPT	0.508
			2	00	A	4	HAPLAQUOLL	0.775
			3	00	A	0.5	HAPLAQUOLL	0.469
			4	00	A	0.5	UDIFLUVENT	0.764
			5	00	A	0.5	HAPLAQUOLL	0.594
			6	00	A	0.5	HAPLAQUOLL	0.480
	Livingston	1979-609	1	00	A	1	ARGIAQUOLL	0.977
			2	00	A	2	ARGIAQUOLL	0.933
			3	34	V	5	ARGIAQUOLL	0.941
			4	00	A	1	ARGIAQUOLL	0.808
			5	34	V	7	ARGIAQUOLL	0.930
			6	00	A	1	FLUVAQUENT	0.888
		1979-707	1	33	W0/T	6	OCHRAQUALF	0.675
			2	00	W1/T	2	ARGIALBOLL	0.828
			3	00	W1/T	2	HAPLUDALF	0.786

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
			4	33	W0/T	6	ARGIAQUOLL	0.764
			5	12	W0/T	2	ARGIAQUOLL	0.685
			6	00	W1/T	2	ARGIALBOLL	0.867
	Mercer	1979-635	1	32	W0/T	8	OCHRAQUALF	0.437
			2	11	W0/T	3	ARGIUDOLL	0.477
			3	23	T	10		0.496
			4	11	W1/T	2	HAPLUDALF	0.672
			5	11	W1/T	2	HAPLUDALF	0.748
			6	24	W0/T	6	ARGIALBOLL	0.727
	Putnam	1978-13	1	11	W1/T	0.1	ARGIALBOLL	0.851
			2	34	W1/T	5	ARGIALBOLL	0.887
			3	11	W1/T	0	ARGIALBOLL	0.864
			4	32	W1/T	1.5	ARGIALBOLL	0.782
			5	34	W1/T	2	ALBAQUALF	0.812
			6	11	W1/T	0.1	ARGIALBOLL	0.856
			7	11	W1/T	0.1	ARGIALBOLL	0.845
			8	33	W1/T	3	ARGIUDOLL	0.618
	Sullivan	1979-643	1	42	W0/T	10	HAPLUDALF	0.696
			2	32	W0/T	6	OCHRAQUALF	0.480
			3	32	T	10	HAPLUDALF	0.449
			4	11	W0/T	3	HAPLUDALF	0.460
			5	33	T	14	HAPLUDALF	0.353
			6	33	T	12	HAPLUDALF	0.518
	Worth	1979-619	1	23	W0/T	10	HAPLUDALF	0.633
			2	33	W0/T	8	HAPLUDALF	0.729
			3	34	W0/T	7	ARGIAQUOLL	0.692
			4	32	W0/T	7.5	HAPLUDALF	0.721
			5	24	T	4	ARGIAQUOLL	0.627
			6	33	T	6	ARGIAQUOLL	0.542
V Northeastern Missouri	Adair	1979-712	1	11	W1/T	1	ALBAQUALF	0.786
			2	11	W1/T	1	ALBAQUALF	0.805
			3	11	W1/T	1	ALBAQUALF	0.678
			4	12	W1/T	2	OCHRAQUALF	0.759
			5	11	W1/T	1	ALBAQUALF	0.717
			6	12	W1/T	2	ALBAQUALF	0.746
	Audrain	1978-6	1	11	W1/T	1	ALBAQUALF	0.650
			2	11	W1/T	0.5	ALBAQUALF	0.753
			3	11	W1/T	0.5	OCHRAQUALF	0.679
			4	11	W1/T	0.5	ALBAQUALF	0.741
			5	11	W1/T	0.5	HAPLUDALF	0.759
			6	11	W1/T	0.5	ARGIAQUOLL	0.747

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
			7	11	W1/T	1.5	ALBAQUALF	0.727
			8	11	W1/T	1	ALBAQUALF	0.763
			9	11	W1/T	0.5	ALBAQUALF	0.775
			10	11	W1/T	0.5	ALBAQUALF	0.795
			11	11	W1/T	2	ALBAQUALF	0.716
			12	11	W1/T	2	ALBAQUALF	0.667
	Clark	1979-665	1	22	W0/T	4	HAPLUDALF	0.586
			2	11	W1/T	2	HAPLUDALF	0.793
			3	22	W0/T	3	HAPLUDALF	0.590
			4	11	W1/T	2	HAPLUDALF	0.679
			5	22	W0/T	3	OCHRAQUALF	0.495
			6	22	W0/T	4	HAPLUDALF	0.586
	Knox	1979-2	1	11	W1/T	0.5	ALBAQUALF	0.798
			2	11	W1/T	1	ALBAQUALF	0.784
			3	32	W1/T	3	OCHRAQUALF	0.775
			4	11	W1/T	1	OCHRAQUALF	0.740
			5	32	W1/T	1	ALBAQUALF	0.842
			6	32	W1/T	2	OCHRAQUALF	0.684
		1979-731	1	23	W0/T	6	OCHRAQUALF	0.304
			2	11	W1/T	1	ALBAQUALF	0.864
			3	33	W0/T	7	HAPLUDALF	0.435
			4	11	W1/T	1	ALBAQUALF	0.838
			5	33	W0/T	12	HAPLUDALF	0.737
			6	11	W1/T	1	ALBAQUALF	0.826
	Lewis	1979-646	1	11	W1/T	1	ARGIALBOLL	0.787
			2	11	W1/T	1.5	ARGIALBOLL	0.856
			3	11	W1/T	1	ALBAQUALF	0.876
			4	11	W1/T	1	ARGIALBOLL	0.901
			5	11	W1/T	1	ALBAQUALF	0.809
		1979-655	1	11	W1/T	3	ARGIALBOLL	0.732
			2	12	W1/T	1	HAPLUDALF	0.760
			3	12	W1/T	2	ALBAQUALF	0.658
			4	12	W1/T	2	ALBAQUALF	0.790
			5	11	W1/T	1	ALBAQUALF	0.785
			6	12	W1/T	1	ALBAQUALF	0.796
	Macon	1979-610	1	43	W0/T	5	HAPLUDALF	0.594
			2	33	W0/T	10	HAPLUDALF	0.493
			3	32	W0/T	4	HAPLUDALF	0.758
			4	32	T	8	HAPLUDALF	0.518
			5	33	W0/T	11	HAPLUDALF	0.472
			6	33	W0/T	5	HAPLUDALF	0.686

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
		1979-611	1	11	W1/T	1	ALBAQUALF	0.776
			2	12	W0/T	2	ALBAQUALF	0.554
			3	33	W1/T	3	ALBAQUALF	0.746
			4	12	W1/T	3	OCHRAQUALF	0.762
			5	12	W1/T	1.5	ALBAQUALF	0.733
			6	12	W1/T	4	ALBAQUALF	0.671
		1979-709	1	11	W1/T	2	ALBAQUALF	0.667
			2	12	W1/T	3	HAPLUDALF	0.699
			3	32	W0/T	4	OCHRAQUALF	0.711
			4	11	W0/T	1	ALBAQUALF	0.759
			5	12	W1/T	2	OCHRAQUALF	0.770
			6	43	W0/T	4	HAPLUDALF	0.666
	Marion	1979-649	1	32	W1/T	2	OCHRAQUALF	0.899
			2	12	W1/T	1.5	ARGIUDOLL	0.952
			3	33	W1/T	4	ALBAQUALF	0.846
			4	23	W1/T	4	OCHRAQUALF	0.694
			5	11	W1/T	1	ARGIALBOLL	0.893
			6	33	W1/T	4	ARGIALBOLL	0.806
		1979-733	1	12	W1/T	2	HAPLUDALF	0.943
			2	11	W1/T	1	ALBAQUALF	0.799
			3	11	W1/T	1	ALBAQUALF	0.773
			4	11	W1/T	1	ALBAQUALF	0.855
			5	11	W1/T	1	ALBAQUALF	0.920
			6	11	W1/T	1	ARGIALBOLL	0.835
	Ralls	1979-650	1	44	A	5	UDIFLUVENT	0.900
			3	43	W1/T	12	UDORTHENT	0.586
			4	34	W0/T	6	HAPLUDALF	0.800
			5	32	W0/T	7	HAPLUDALF	0.684
	Randolph	1978-17	1	12	W1/T	2.5	HAPLUDALF	0.710
			2	11	W1/T	0.5	ALBAQUALF	0.686
			3	12	W1/T	1	OCHRAQUALF	0.692
			4	12	W1/T	1.5	ARGIALBOLL	0.624
			5	11	W1/T	2	ARGIALBOLL	0.720
			6	12	W1/T	2.5	OCHRAQUALF	0.563
			7	11	W1/T	1	ALBAQUALF	0.639
			8	12	W1/T	1.5	OCHRAQUALF	0.643
		1979-642	1	11	W1/T	1.5	OCHRAQUALF	0.617
			2	32	W0/T	5	OCHRAQUALF	0.553
			3	34	W1/T	4	ARGIALBOLL	0.817
			4	32	W0/T	2.5	OCHRAQUALF	0.705
			5	32	W1/T	3	OCHRAQUALF	0.693

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
			6	32	W1/T	3	OCHRAQUALF	0.643
	Schuyler	1979-710	1	42	W0/T	3	OCHRAQUALF	0.842
			2	43	W0/T	5	OCHRAQUALF	0.704
			3	43	W0/T	4	OCHRAQUALF	0.587
			4	42	W0/T	3	OCHRAQUALF	0.745
			5	43	W0/T	6	HAPLUDALF	0.659
			6	33	W1/T	5	ALBAQUALF	0.862
	Scotland	1979-652	1	00	A	1	ARGIAQUOLL	0.727
			2	00	A	1	HAPLAQUOLL	0.454
			3	00	A	1	HAPLAQUOLL	0.854
			4	00	A	1	HAPLAQUOLL	0.667
			5	00	A	1	ARGIAQUOLL	0.662
			6	00	A	1	ARGIALBOLL	0.616
		1979-728	1	34	A	1	ARGIUDOLL	0.773
			2	34	A	2	ARGIUDOLL	0.645
			3	00	A	1	ARGIALBOLL	0.890
			4	00	A	1	HAPLAQUOLL	0.938
			5	00	A	1	HAPLAQUOLL	0.835
			6	34	A	3	ARGIUDOLL	0.839
		1979-734	1	11	W1/T	1	ARGIALBOLL	0.798
			2	11	W1/T	1	ALBAQUALF	0.847
			3	11	W1/T	1	ARGIALBOLL	0.792
			4	42	W1/T	2	OCHRAQUALF	0.573
			5	23	W0/T	6	ARGIUDOLL	0.703
			6	11	W1/T	1	ALBAQUALF	0.781
	Shelby	1978-16	1	11	W1/T	0.5	ARGIALBOLL	0.793
			2	11	W1/T	1	ALBAQUALF	0.675
			4	34	W1/T	6	ALBAQUALF	0.691
			6	33	W1/T	4	OCHRAQUALF	0.621
			7	35	W1/T	7	ALBAQUALF	0.543
		1979-653	1	23	T	6	ALBAQUALF	0.618
			2	11	W1/T	1	ALBAQUALF	0.777
			3	12	W1/T	4	HAPLUDALF	0.504
			4	23	W0/T	6	HAPLUDALF	0.450
			5	23	W0/T	8	HAPLUDALF	0.292
			6	12	W0/T	3	HAPLUDALF	0.493
		1979-729	1	43	W0/T	5	OCHRAQUALF	0.697
			2	43	W0/T	7	HAPLUDALF	0.705
			3	22	W0/T	2	OCHRAQUALF	0.748
			4	12	W1/T	2	OCHRAQUALF	0.839
			5	33	W0/T	6	HAPLUDALF	0.699

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
			6	12	W0/T	3	OCHRAQUALF	0.691
		1979-735	1	11	W1/T	1	ALBAQUALF	0.814
			2	11	W1/T	1	OCHRAQUALF	0.800
			3	11	W1/T	1	ALBAQUALF	0.807
			4	12	W1/T	1.5	ALBAQUALF	0.838
			5	12	W1/T	1.5	ALBAQUALF	0.867
			6	12	W1/T	1	ALBAQUALF	0.855
VI Southwestern Missouri Prairies	Henry	1978-10	1	32	W1/X	1.5	ARGIAQUOLL	0.669
			2	33	W1/X	1	ARGIAQUOLL	0.719
			3	34	W1/X	1.5	ARGIAQUOLL	0.693
			4	11	W1/X	0	ARGIAQUOLL	0.744
			5	33	W1/X	1.5	ARGIUDOLL	0.722
			6	34	W1/X	1.5	ARGIAQUOLL	0.678
			7	32	W1/X	2	ARGIAQUOLL	0.734
			8	34	W1/X	0.5	ARGIAQUOLL	0.688
	Vernon	1978-11	1	11	W1/X	0.1	ARGIUDOLL	0.783
			2	34	W1/X	0.1	ALBAQUALF	0.801
			3	33	W1/X	2.5	ARGIUDOLL	0.823
			4	35	W0/X	0.5	ARGIAQUOLL	0.739
			5	43	W1/X	3	ARGIUDOLL	0.815
			7	32	W1/X	1	ARGIUDOLL	0.746
			8	42	W1/X	1.5	ARGIUDOLL	0.783
VIIa Western Ozarks	Lawrence	1978-4	1	00	A	0.2	HAPLUDALF	0.986
			2	00	A	0.2	HAPLUDALF	0.954
			3	00	A	0.2	HAPLUDOLL	0.962
			4	00	A	0.2	HAPLUDOLL	0.922
			5	00	A	0.2	HAPLUDOLL	0.984
			6	00	A	0.2	ARGIUDOLL	0.980
			7	00	A	0.2	HAPLUDALF	0.929
			8	00	A	0.2	ARGIUDOLL	0.976
			9	00	A	0.2	ARGIUDOLL	0.968
			10	00	A	0.2	HAPLUDOLL	0.873
			11	00	A	0.2	HAPLUDOLL	0.817
			12	00	A	0.2	HAPLUDOLL	0.983
		1978-19	1	00	A	0.1	HAPLUDOLL	0.964
			2	00	A	0.1	HAPLUDOLL	0.933
			3	00	A	0.1	HAPLUDOLL	0.915
			4	00	A	0.1	HAPLUDOLL	0.967
			5	00	A	0.1	HAPLUDOLL	0.936
			6	00	A	0.1	ARGIUDOLL	0.967
			7	00	A	0.1	HAPLUDOLL	0.964

Table 1. Continued

Major Land System	County	Field Number	Plot Number	Hillslope Position See Fig 11 And See Table 5	Stratigraphy of Materials (See Table 5)	Slope %	Soil Classification	PI
			8	00	A	0.1	HAPLUDOLL	0.957
			9	00	A	0.1	HAPLUDOLL	0.837
			10	00	A	0.1	ARGIUDOLL	0.936
			11	00	A	0.1	HAPLUDOLL	0.962
			12	00	A	0.1	ARGIUDOLL	0.967
			13	00	A	0.1	HAPLUDOLL	0.968
			14	00	A	0.1	HAPLUDOLL	0.975
			15	00	A	0.1	ARGIUDOLL	0.965

Table 2. Textural class names

Textural Class Code	Textural Class Name
COS	Coarse sand
MS	Medium sand
FS	Fine sand
LS	Loamy sand
LFS	Loamy fine sand
SL	Sandy loam
FSL	Fine sandy loam
L	Loam
SIL	Silt loam
SI	Silt
SICL	Silty clay loam
SCL	Sandy clay loam
CL	Clay loam
SC	Sandy clay
SIC or C	Silty clay or clay

Table 3. Bulk densities and corresponding sufficiencies of bulk density.

Bulk Dens.	SUFF	Bulk Dens.	SUFF	Bulk Dens.	SUFF
(g/cm^3)		(g/cm^3)		(g/cm^3)	
1.30	1.00	1.47	.88	1.64	.54
1.31	.99	1.48	.87	1.65	.50
1.32	.98	1.49	.87	1.66	.47
1.33	.98	1.50	.86	1.67	.44
1.34	.97	1.51	.85	1.68	.40
1.35	.96	1.52	.85	1.69	.37
1.36	.96	1.53	.84	1.70	.34
1.37	.95	1.54	.83	1.71	.30
1.38	.94	1.55	.83	1.72	.27
1.39	.93	1.56	.80	1.73	.24
1.40	.93	1.57	.77	1.74	.20
1.41	.92	1.58	.73	1.75	.17
1.42	.91	1.59	.70	1.76	.14
1.43	.91	1.60	.67	1.77	.10
1.44	.90	1.61	.63	1.78	.07
1.45	.89	1.62	.60	1.79	.04
1.46	.89	1.63	.57	1.80	.00

Table 4. Values of salt pH (pHs) and corresponding sufficiencies.

pHs	Suff	pHs	Suff
5.5	1.00	4.4	.65
5.4	.98	4.3	.61
5.3	.97	4.2	.56
5.2	.95	4.1	.52
5.1	.94	4.0	.47
5.0	.92	3.9	.43
4.9	.88	3.8	.38
4.8	.83	3.7	.34
4.7	.79	3.6	.30
4.6	.74	3.5	.25
4.5	.70	3.4	.21

Table 5. Coding for local landform, hillslope position and stratigraphy of materials. Coding modified from "Pedon Coding System for the National Cooperative Soil Survey" (July 1979).

LOCAL LANDFORMS

Floodplain	(P)
Stream Terrace	(T)
Pediment	(V)
Hillside or Upland Ridge	(IR)

HILLSLOPE POSITION (For IR and V Landforms)

		Slope Profile				
		Summit	Shoulder	Backslope	Footslope	Toeslope
Interfluve or Divide	10	11	12	—	—	—
Headslope	20	—	22	23	24	25
Sideslope	30	—	32	33	34	35
Noseslope	40	—	42	43	44	45

00 = Floodplain or stream terrace

STRATIGRAPHY OF MATERIALS

Alluvium	(A)
Eolian, Loess	(W)
Loess > 2M thick	(W2)
> 3M thick	(W3)
Glacial Till (including paleosols)	(T)
Local Colluvium (or Alluvium)	(V)
Residual Material	(X)
Solid Rock	(R)
Loess over Paleosol in Till	(W/T)
Loess > 2M	(W2/T)
Loess 1 - 2M	(W1/T)
Loess < 1M	(WO/T)
Loess over Solid Rock	(W/R)
Loess over Residual Material	(W/X)
Colluvium over Loess	(V/W)

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