

Selected Soils of Madison County, Virginia —
Their Chemical Properties



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Altavista Clayey Subsoil Variant	91	15
Appling Fine Sandy Loam	19	15
Appling Fine Sandy Loam, Very Deep	119	15
Augusta Silt Loam, Clayey Subsoil Variant	64	16
Baile Stony Silt Loam	341	16
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Bremo Silt Loam	153	17
Bucks Loam, Permeable Substratum	71	17
Buncombe Loamy Fine Sand	10	17
Calverton Silt Loam	81	17
Catoctin Silt Loam	53	17
Cecil Fine Sandy Loam	14	18
Chester Loam	42	18
Chewacla Silt Loam	2	18
Colfax Fine Sandy Loam	23	18
Congaree Loam	7	19
Creedmoor Silt Loam	81	19
Davidson Clay Loam	31	19
Dyke Loam	96	19
Elbert Silt Loam	52	19

<u>List of Soils</u>	Mapping Unit No.	Chemical Analyses Page
Elioak Fine Sandy Loam	122	20
Eubanks Fine Gravelly Loam	244	20
Glenelg Loam	22	20
Hazel Loam	121	20
Hiwassee Loam	94	21
Iredell Silt Loam	48	21
Lewisberry Sandy Loam	173	21
Lloyd Fine Sandy Loam	235	21
Louisburg Sandy Loam	26	21
Manor Silt Loam	21	22
Mayodan Fine Sandy Loam	69	22
Meadowville Loam	51	22
Penn Loam	73	22
Porters Very Stony Loam	109	22
Rapidan Silt Loam	86	23
Starr Silt Loam	6	23
Thurmont Loam	99	23
Trego Loam	118	23
Tusquitee Stony Loam	106	24
Unison Loam	141	24
Watt Channery Silt Loam	75	24
Wehadkee Silt Loam	5	24
Wickham Loam	89	25
Worsham Loam	8	25
Zion Silt Loam	49	25

CHEMICAL PROPERTIES OF SELECTED MADISON COUNTY, VIRGINIA, SOILS

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INTRODUCTION

Bounded on the north by Rappahannock County, on the east by Culpeper County, on the west by Page County, and on the south by Orange and Green Counties, historic Madison County comprises about 327 square miles of north central Virginia. Madison, the county seat, situated near the center of the county, is located about 70 miles northwest of Richmond and 75 miles southwest of Washington, D. C. Madison County was formed in 1793 from Culpeper County and named for James Madison, fourth President of the United States. The county had a population of 8,638 persons according to the 1970 census. Forest and farm woodland comprise about 60 percent of the county while about 40 percent is cleared and used for crops and pasture.

A soil survey of Madison County was completed in 1965 by the Virginia Agricultural Experiment Station in cooperation with Madison County and the Soil Conservation Service. "Soils of Madison County, Virginia", a comprehensive report, was published in 1965 and widely distributed in the county. In addition to the soils report, soil maps with a scale of 1" = 600' are available in the Agricultural Extension Office. The national Soil Survey Report containing maps is in the publication process.

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During the soil survey, soil scientists examined the soils and underlying materials in a systematic fashion in order to classify the soils and to make interpretations for multi-purpose soil usage. The soils were described and the distinguishing characteristics were recorded in a standard manner. Samples were taken from typical soils occurring extensively in the county in order to determine the characteristic chemical properties by laboratory analyses. Chemical properties of the common soils of Madison County are presented in this report.

Geographical Setting

Madison County lies within the Piedmont and the Blue Ridge physiographic provinces. Elevations range from 298 feet at the junction of the Robertson (Robison) and Rapidan Rivers to 4,049 feet at the summit of Hawksbill Mountain (1, 3). About 70 percent of the county is located in the Piedmont province, which is characterized by gently to strongly sloping relief with random steep areas. The Blue Ridge province comprises the western part of the county and it accounts for about 30 percent of the total land area in the county. This area ranges from moderately steep to very steep with elevations ranging from about 1,000 to 4,000 feet above mean sea level. Soils of this area are generally rocky.

The rocks of Madison County, which serve as parent materials for soil formation, consist of igneous, sedimentary, and metamorphic types. Seven major geologic formations occur in the county. Rocks of the Piedmont province are dominantly metamorphosed and those of both igneous and sedimentary origin occur. They consist of granite gneisses, mica schists, and phyllites with smaller areas of greenstone schists, sandstone conglomerates, and shale (1,5).

Rocks of the Blue Ridge province are primarily metamorphosed rocks of igneous origin. They consist of greenstone schist, granodiorites, granites, and granite gneisses with small inclusions of sandstone (1, 5).

Soil Morphology

Soils comprise the surface landscape of the earth's outer crust. These natural bodies result from the weathering actions of climate, organisms, and relief on parent materials over a period of time. Since soils are natural bodies, they may occur as discrete individuals, but they are often mixed and interwoven into complicated patterns. Adjacent soils are often linked by broad transition zones.

The soils of Madison County are quite complex and they occur in intricate patterns of the landscape. Approximately 350 individual soil units were delineated in the Madison County soil survey (2). Each of these soil units differs in some manner from the others. The forces of gravity and water acting on complex parent materials have had a dominant influence on soil formation in the county. These forces have contributed to weathering and movement of parent materials resulting in development of transported soils at lower elevations. Many of the soils along the base of the Blue Ridge regions of the county have formed in materials moved downslope by the forces of gravity. Flooding waters from the Hughes, Robertson (Robinson), Rapidan, and Conway Rivers have eroded and deposited materials.

A hypothetical soil profile having all the principal horizons is presented in Figure 1. Few soils contain all the horizons exhibited by the hypothetical profile.

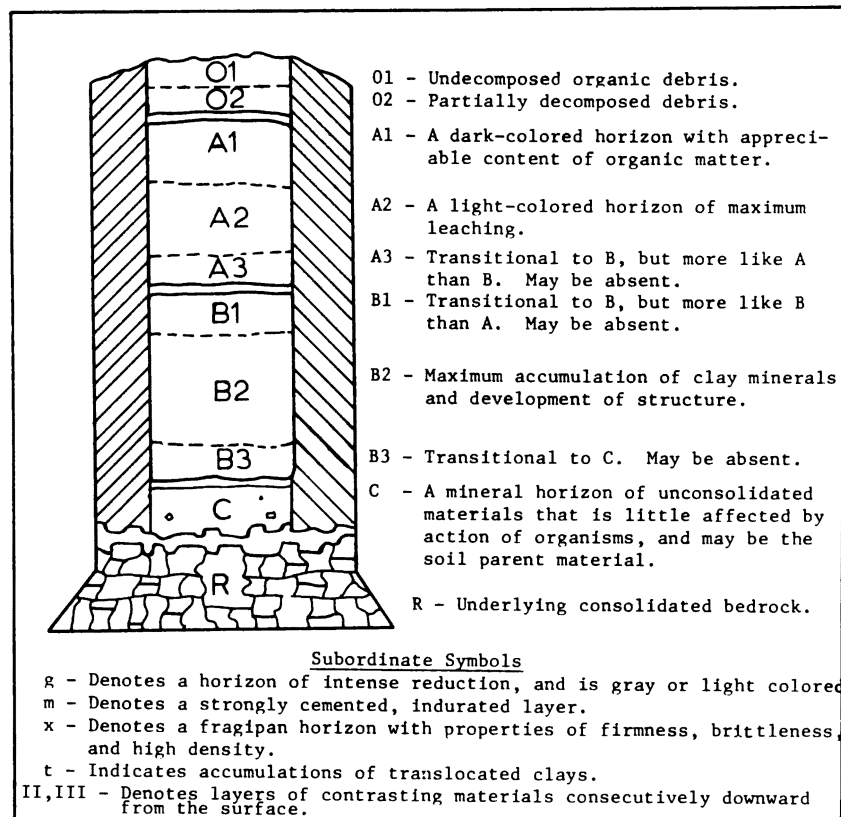


Fig. 1 - Hypothetical Soil Profile with all the Principal Horizons.

The soils of Madison County are essentially a mixture of inorganic particles with relatively small amounts of decaying organic matter. The various particle-size groups (sand, silt, clay) vary widely and proportions of the groups (textural classes) are defined in the glossary. Physical properties of sand, silt, and clay differ considerably. Uncoated sand particles are rather inert, and they exhibit little cohesion or plasticity. In contrast, clay particles are reactive and highly cohesive and plastic. Clays also have high water-holding capacity, and retard movement of air and water. Silt particles are intermediate to sands and clays.

Chemical Properties

Soil chemical properties in combination with other features such as permeability, structure, texture, and consistency largely determine the limitations and potential of an individual soil. Chemical properties are not evident in visual observations of a soil and laboratory analyses are necessary to define these characteristics. The amount and type of clay minerals present and the organic matter content largely regulate the chemical nature of soils. These substances have the capacity to attract and hold cations. Many cations are essential plant nutrients.

Calcium, magnesium, and potassium are the major non-acidic exchangeable cations in soils. The cations on the soil exchange complexes are in dynamic equilibrium with the soil solution. When non-acidic cations are removed by plants or organisms, aluminum and hydrogen ions may replace them on the exchange site. Since aluminum and hydrogen act as acids, the exchangeable hydrogen (reported in Table 1) actually includes both hydrogen and aluminum. The exchangeable aluminum is presented in a separate column in Table 1.

The cations are reported in units of milli-equivalents, which is defined as one milligram of hydrogen or the amount of any other ion that will combine with or displace it. The unit can be converted to pounds per acre on the basis that an acre of soil (about 6 inches deep) weighs approximately 2,000,000 pounds. One milli-equivalent per 100 grams of soil is equivalent to 942 pounds of potash (K_2O) or 1,000 pounds of limestone ($CaCO_3$) per acre furrow slice. The total exchangeable cations is equal to the cation exchange capacity of the soil.

Soil pH is a measure of the active soil acidity or basicity. It is defined as the logarithm of the reciprocal of the H-ion concentration

($\text{pH} = \log 1/[\text{H}^+]$). In acid solutions the pH is always less than 7, and in an alkaline solution, it is greater than 7. The following descriptive designations are commonly used to express pH values.

	pH
Extremely acid.	Below 4.5
Very strongly acid.	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline.	9.1 ⁺

Since the pH scale is logarithmic, the extent of acidity or basicity does not occur in equal increments. For example, a soil at pH 5 has 10 times as much acidity as one at pH 6, while a soil at pH 4 has 100 times more acidity than the pH 6 soil. Soil pH levels have an important relationship on the solubility of plant nutrients. Extreme pH levels give rise to severe corrosion of metallic and concrete objects in contact with the soil.

Truog phosphorus, a dilute acid soluble phosphorus, is a estimate of the amount of phosphorus readily available to plants in acid soils. Generally, 25 parts per million (ppm) is adequate for many common crops and plants.

Methods of Analyses - Extractable acidity, bases, and organic matter content were determined using modified procedure of Peech (4). Available phosphorus was determined via the Truog procedure (6) using a Klett-Summerson Photoelectric Colorimeter. Soil pH was determined in 1:2 soil-water mixture employing a Beckman Zeromatic pH meter. Exchangeable (KCl) aluminum was determined via modified Yuan procedure (7).

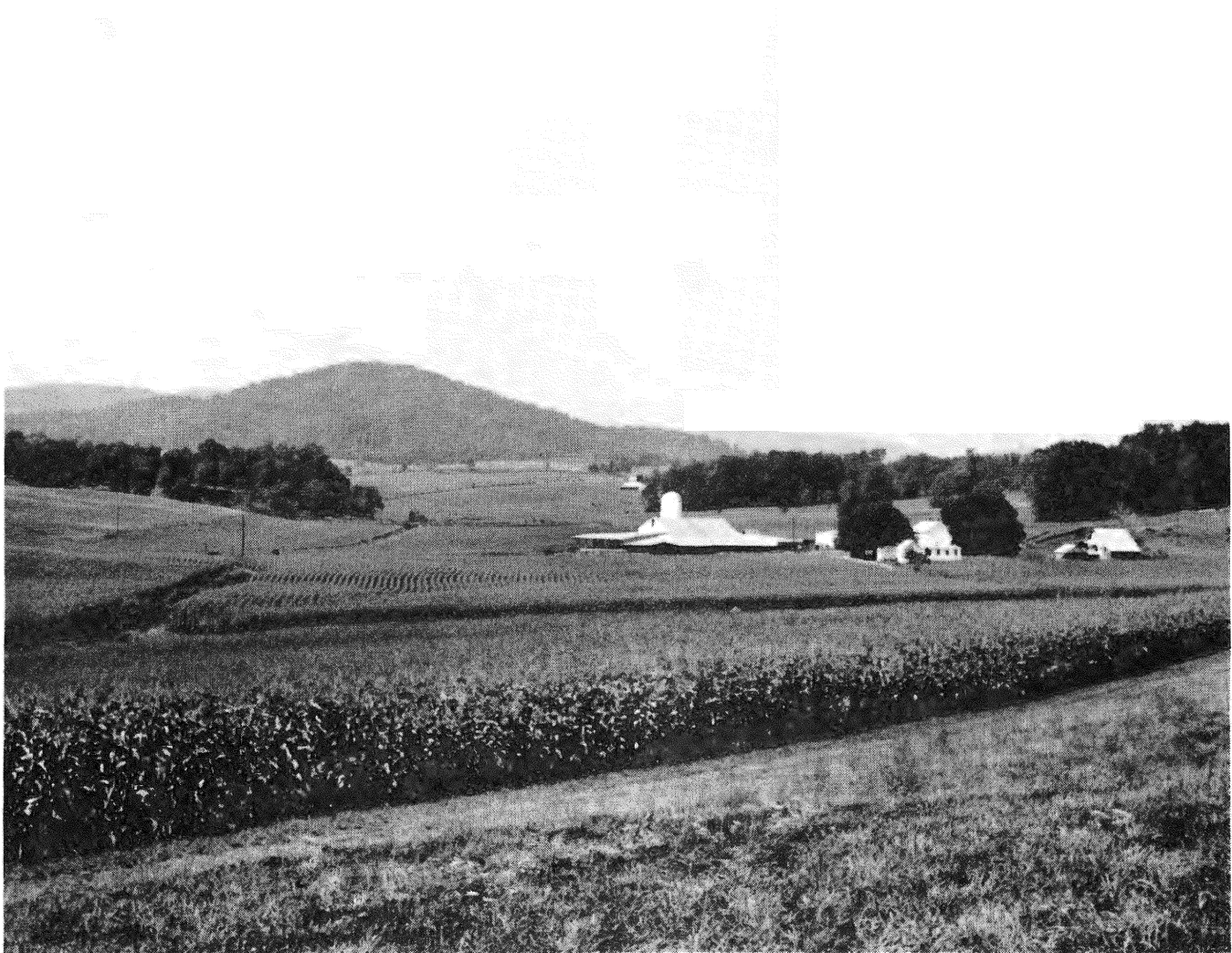


Photo 1. Good conservation practices using the Chewacla, Congaree, and Starr soils in continuous corn, and reserving the upland soils, Lloyd, Brandywine, Chester, and Eubanks in permanent pasture and hay crops.



Photo 2. A new soil is born - Parent material, residuum from granite rock, accumulates in crevice. Grass seeds sprout and grow, stabilizing the material from erosion, and if successful, the slow, intricate process to soil maturity is begun.



Photo 3. Continuous corn rotation on Chewacla soils - 187 bushels of corn per acre were harvested from this field in 1965.



Photo 4. Soil materials along with boulders and other rock fragments washed and rolled from mountain uplands to form colluvial soils in the valleys. The soil is naturally fertile and productive but tillage with normal machinery is impractical due to stone content. These soils are excellent for yellow poplar forest and they are suited to native Bluegrass pasture.



Photo 5. Extremely stony riverwash located on flood plains - unsuited to cropland and forest due to cobble and gravel content. Little fine soil material was originally deposited or otherwise it was moved downstream by flood waters.



Photo 6. Rolling landscape of Lloyd, Eubanks, Brandywine, Hiwassee, and Meadowville soils are typical of a large portion of Madison County.



Photo 7. Brandywine, Chester, and Meadowville soils are well suited to native Bluegrass pastures. Note the late summer drought effects on the Brandywine soil in the upper left corner of the photo.



Photo 8. Stony Brandywine soils on steep slopes are productive as native Bluegrass pasture lands. Small areas of Chester and Meadowville soils make good garden areas.

Table 1. Soil Chemical Data

SOIL CHEMICAL DATA

Hor- izon	Depth (in.)	pH	Truog P (ppm)	Organic Matter (%)	Exchangeable Cations (me./100g. of soil)						Base Satur- ation (%)
					Ca	Mg	K	H	Al*	Total**	
ALBANO SILT LOAM (80)											
Apg	0-8	5.78	19.51	3.86	7.73	3.00	0.16	10.64	0.08	21.53	50.58
B1g	8-13	5.40	5.37	1.75	3.41	2.64	0.10	9.70	0.21	15.85	38.80
B2g	13-32	5.62	1.95	1.05	2.88	2.80	0.13	7.38	0.15	13.19	44.05
ALTAVISTA LOAM, CLAYEY SUBSOIL VARIANT (91)											
Ap	0-11	6.32	135.12	2.60	10.59	1.53	0.90	6.42	0.05	19.44	66.98
B21t	11-26	5.50	7.32	0.26	5.79	1.53	0.16	8.38	0.14	15.86	47.16
B22t	26-36	5.50	4.88	0.21	4.26	1.53	0.14	8.38	0.08	14.31	41.44
B3tg	36-46	5.68	4.88	0.15	4.24	1.53	0.17	9.19	0.07	15.13	39.26
Cg	46-54	5.50	7.32	0.12	2.83	0.99	0.12	6.06	0.09	10.00	39.40
APPLING FINE SANDY LOAM (19)											
A1	0-1	3.80	5.85	11.37	0.70	0.35	0.18	19.98	4.83	21.21	5.80
A2	1-9	4.60	1.46	1.38	0.05	0.08	0.11	6.49	1.21	6.73	3.57
B1t	9-13	4.60	0.49	0.71	0.12	0.26	0.22	7.11	3.21	7.71	7.78
B2t	13-30	4.72	0.49	0.42	0.05	0.97	0.34	9.36	4.29	10.72	12.69
B3t	30-42	4.70	1.95	0.24	0.09	0.67	0.30	11.35	6.16	12.41	8.54
C	42-74	4.58	0.49	0.04	0.00	0.27	0.12	7.92	5.44	8.31	4.69
APPLING FINE SANDY LOAM, VERY DEEP (119)											
Ap	0-9	5.40	1.46	0.52	0.46	0.29	0.04	2.15	0.18	2.94	26.87
B1	9-15	4.90	0.49	0.30	0.92	0.26	0.10	3.10	0.98	4.38	29.22
B2	15-39	4.67	0.98	0.06	0.23	0.31	0.14	7.76	3.22	8.44	8.06
B3	39-57	4.80	0.98	0.05	0.07	0.16	0.08	8.12	3.58	8.43	3.68
C	57-85	4.72	11.71	0.03	0.01	0.23	0.13	11.70	6.61	12.07	3.07

* Not included in the summation of exchangeable cations

** Summation of exchangeable cations

SOIL CHEMICAL DATA

Hor- izon	Depth (in.)	pH	Truog P (ppm)	Organic Matter (%)	Ca	Exchangeable Cations (me./100 g. of soil)					Base Satur- ation (%)
						Mg	K	H	Al*	Total**	
AUGUSTA SILT LOAM, CLAYEY SUBSOIL VARIANT (64)											
Ap	0-9	6.00	20.49	2.16	5.27	1.20	0.15	6.10	0.09	12.72	52.04
Blt	9-13	4.72	3.90	0.89	3.02	0.69	0.09	9.68	1.66	13.48	28.19
B2ltg	13-28	4.70	4.39	0.40	2.45	0.81	0.08	8.69	2.13	12.03	27.76
B22tg	28-47	4.90	4.39	0.08	6.42	3.08	0.16	7.91	1.31	17.57	54.98
Cg	47-64	5.60	12.20	0.07	10.84	6.55	0.38	4.87	0.29	22.64	78.49
BAILE STONY SILT LOAM (341)											
A1	0-1	3.80	12.68	24.15	1.77	0.66	0.40	67.92	9.94	70.75	4.00
A2	1-9	4.72	2.93	13.77	3.32	1.20	0.29	26.55	1.35	31.36	15.34
B21	9-23	5.00	0.49	3.31	1.98	0.64	0.16	18.49	1.04	21.27	13.07
B22	23-30	5.50	6.34	0.59	1.60	1.14	0.12	8.25	0.05	11.11	25.74
B23	30-41	5.80	7.32	0.23	1.68	1.38	0.10	7.29	0.04	10.45	30.24
IIB3	41-50	5.90	8.29	0.17	1.71	1.41	0.10	7.09	0.04	10.31	31.23
BRANDYWINE FINE GRAVELLY LOAM (127)											
A1	0-2	4.42	1.95	5.46	0.15	0.05	0.17	10.76	2.57	11.13	3.32
A2	2-11	4.52	0.98	1.50	0.18	0.05	0.12	7.38	1.66	7.73	4.53
B	11-16	4.92	1.46	0.48	0.22	0.46	0.20	7.51	2.55	8.39	10.49
C1	16-28	4.90	3.41	0.07	0.07	0.35	0.33	7.09	2.17	7.84	9.57
C2	28-54	5.00	2.44	0.09	0.00	0.15	0.24	4.09	1.44	4.48	8.71
BRANDYWINE LOAM, VERY DEEP (126)											
Ap	0-12	5.50	5.37	0.75	3.29	1.38	0.21	6.41	0.35	11.29	43.22
C1	12-22	5.20	0.49	0.10	1.16	1.07	0.15	5.26	0.47	7.64	31.15
C2	22-72	5.10	1.95	0.00	0.41	1.20	0.16	4.45	0.55	6.22	28.46

* Not included in the summation of exchangeable cations

** Summation of exchangeable cations

SOIL CHEMICAL DATA

Hor izon	Depth (in.)	pH	Truog P (ppm)	Organic Matter (%)	Exchangeable Cations (me./100g. of soil)					Total**	Base Satur- ation (%)
					Ca	Mg	K	H	Al*		
<u>BREMO SILT LOAM (153)</u>											
Ap	0-7	5.62	13.66	4.40	1.51	1.40	0.95	10.29	0.14	14.15	27.28
B2t	7-12	6.00	0.98	0.63	7.46	6.17	0.08	6.57	0.13	20.28	67.60
C	12-26	5.90	0.00	0.23	9.00	9.47	0.08	7.06	0.16	25.61	72.43
<u>BUCKS LOAM, PERMEABLE SUBSTRATUM (71)</u>											
Ap	0-9	5.52	44.39	1.67	1.95	0.31	0.24	3.93	0.19	6.43	38.88
B1t	9-14	5.12	0.49	0.14	1.31	0.40	0.12	3.37	0.60	5.20	35.19
B2t	14-33	4.92	1.95	0.08	2.66	0.47	0.12	5.53	1.67	8.78	37.02
B3t	33-40	4.32	0.98	0.01	1.69	1.14	0.13	7.71	2.73	10.67	27.74
C	40-70	4.20	1.46	0.01	0.25	0.78	0.14	10.02	6.75	11.19	10.46
<u>BUNCOMBE LOAMY FINE SAND (10)</u>											
Ap	0-12	4.66	6.83	0.40	0.15	0.00	0.05	3.15	0.60	3.35	5.97
C1	12-43	5.00	8.29	0.40	0.77	0.24	0.04	4.06	0.55	5.11	20.55
C2	43-54	5.10	22.93	0.23	1.63	0.46	0.07	5.43	0.52	7.59	28.46
<u>CALVERTON SILT LOAM (81)</u>											
Ap	0-6	5.62	3.90	2.47	3.46	0.89	0.12	6.24	0.13	10.71	41.74
B2t	6-14	5.12	0.98	0.75	1.95	0.99	0.07	5.66	0.62	8.67	34.72
C	14-22	5.24	2.44	0.75	1.98	2.78	0.10	7.09	0.41	11.95	40.67
<u>CATOCTIN SILT LOAM (53)</u>											
Ap	0-9	6.08	19.02	4.95	7.38	1.52	0.50	8.64	0.14	18.04	52.11
B2t	9-14	5.50	2.44	0.95	2.73	1.20	0.23	8.39	0.22	12.55	33.15
C	14-30	5.42	3.41	0.32	1.66	1.65	0.09	9.54	0.24	12.94	26.28

* Not included in the summation of exchangeable cations

** Summation of exchangeable cations

SOIL CHEMICAL DATA

Hor- izon	Depth (in.)	pH	Truog P (ppm)	Organic Matter (%)	Exchangeable Cations (me./100 g. of soil)						Base Satur- ation (%)
					Ca	Mg	K	H	Al*	Total**	
<u>CECIL FINE SANDY LOAM (14)</u>											
A1	0-1	4.80	7.80	4.94	1.74	0.63	0.30	9.86	0.95	12.53	21.31
A2	1-10	4.80	1.46	1.74	0.33	0.23	0.12	5.87	1.25	6.55	10.38
B1t	10-14	4.90	2.44	0.68	0.62	0.28	0.20	5.54	1.36	6.64	16.57
B21t	14-29	5.22	1.95	0.41	0.86	1.06	0.29	6.60	1.49	8.81	25.09
B22t	29-40	5.10	1.95	0.21	0.13	0.94	0.26	9.70	2.17	11.03	12.06
B3t	40-51	5.00	1.95	0.11	0.03	0.60	0.18	7.82	2.13	8.63	9.39
C	51-92	4.90	0.98	0.07	0.06	0.31	0.12	6.03	2.02	6.52	7.52
<u>CHESTER LOAM (42)</u>											
Ap	0-9	5.80	16.59	2.32	3.48	0.92	0.24	11.93	0.24	16.57	28.00
B2t	9-23	5.50	2.93	0.70	2.52	1.01	0.28	9.00	0.46	12.81	29.74
B3t	23-28	5.12	4.39	0.33	1.59	1.71	0.26	8.05	0.45	11.61	30.66
C1	28-55	5.00	5.85	0.28	0.44	0.58	0.27	8.31	1.25	9.60	13.44
C2	55-85	5.00	3.41	0.22	0.16	0.35	0.31	7.24	1.46	8.06	10.17
<u>CHEWACLA SILT LOAM (2)</u>											
Ap	0-9	5.72	12.20	1.46	3.45	0.98	0.14	6.55	0.13	11.12	41.10
C1	9-20	5.50	11.71	1.12	3.01	0.94	0.07	7.69	0.30	11.71	34.33
C2g	20-36	5.38	3.90	0.37	2.49	1.34	0.06	7.04	0.75	10.93	35.59
C3g	36-49	5.40	9.27	0.26	3.97	2.16	0.07	7.20	0.74	13.40	46.27
C4g	49-80	6.00	20.00	0.18	5.36	3.94	0.08	5.74	0.36	15.12	62.04
<u>COLFAX FINE SANDY LOAM (23)</u>											
A1	0-3	5.30	7.80	3.37	2.43	0.82	0.16	5.90	0.19	9.31	36.63
A2	3-11	5.30	3.41	1.19	0.92	0.24	0.05	4.68	0.42	5.89	20.54
B21x	11-26	5.22	1.46	0.17	0.28	1.32	0.08	6.89	2.52	8.47	19.60
B22tg	26-35	5.48	3.90	0.14	0.77	5.98	0.16	5.26	1.06	12.17	56.78
IIB3tg	35-43	6.62	1.46	0.10	0.58	5.03	0.10	1.84	0.24	7.55	75.63
IIC	43-68	6.98	2.44	0.11	0.93	2.60	0.09	1.29	0.16	4.91	73.73

* Not included in the summation of exchangeable cations

** Summation of exchangeable cations

SOIL CHEMICAL DATA

Hor izon	Depth (in.)	pH	Truog P (ppm)	Organic Matter (%)	Ca	Exchangeable Cations (me./100g. of soil)					Base Satur- ation (%)
						Mg	K	H	Al*	Total**	
CONGAREE LOAM (87)											
Ap	0-11	4.90	25.37	1.64	1.79	0.22	0.14	9.76	1.25	11.91	18.05
B2t	11-25	5.48	25.85	0.46	4.72	0.76	0.16	8.42	0.25	14.06	40.11
B3t	25-38	5.70	33.66	0.25	3.03	0.92	0.11	6.65	0.18	10.71	37.91
C1	38-52	5.68	28.78	0.12	0.95	0.29	0.04	4.35	0.14	5.63	22.74
C2	52-75	5.68	21.95	0.08	0.16	0.03	0.02	2.92	0.12	3.13	6.71
CREEDMOOR SILT LOAM (81)											
A1	0-2	5.00	7.80	5.74	1.39	1.13	0.45	15.40	1.17	18.37	16.17
A2	2-8	4.82	3.41	1.04	0.29	0.91	0.24	10.19	2.78	11.63	12.38
B21	8-23	4.78	3.90	0.65	0.35	2.02	0.26	12.96	5.03	15.59	16.87
B22	23-38	4.60	5.37	0.34	0.70	3.16	0.26	15.32	5.65	19.44	21.19
IIC	38-62	4.60	4.39	0.19	1.05	6.40	0.20	17.12	11.44	24.77	30.88
DAVIDSON CLAY LOAM (31)											
Ap	0-7	6.62	7.32	3.17	5.96	1.46	0.38	6.24	0.05	14.04	55.56
B21t	7-26	5.10	4.39	0.91	1.47	1.50	0.16	15.86	1.45	18.99	16.48
B22t	26-58	5.12	5.85	0.17	0.69	0.79	0.29	12.93	1.85	14.70	12.04
C	58-74	5.16	6.34	0.13	0.21	0.53	0.23	11.62	1.90	12.59	7.70
DYKE LOAM (96)											
Ap	0-8	5.70	10.24	3.46	4.88	1.36	0.67	9.31	0.16	16.22	42.60
B21t	8-14	5.16	4.88	0.66	3.09	1.39	0.18	11.30	1.34	15.96	29.20
B22t	14-36	4.80	2.44	0.18	0.26	0.50	0.11	12.31	4.00	13.18	6.60
B3t	36-48	4.72	5.37	0.09	0.24	0.38	0.09	10.55	3.18	11.26	6.31
C	48-84	4.80	4.88	0.09	0.14	0.32	0.08	8.72	2.96	9.26	5.83
ELBERT SILT LOAM (52)											
Alg&A2g	0-11	4.52	2.93	2.17	0.95	0.83	0.09	8.36	2.03	10.23	18.28
B2tg	11-31	6.80	0.49	0.74	21.31	17.67	0.58	2.17	0.13	41.73	94.80
B3tg	31-42	7.40	3.90	0.18	13.11	16.67	0.58	1.29	0.02	31.65	95.92
C1g	42-56	7.32	1.95	0.16	5.22	3.92	0.23	0.70	0.00	10.07	93.05
C2	56-80	7.00	40.98	0.04	14.21	19.17	0.58	2.75	0.06	36.71	92.51

* Not included in the summation of exchangeable cations

** Summation of exchangeable cations

SOIL CHEMICAL DATA

Hor izon	Depth (in.)	pH	Truog P (ppm)	Organic Matter (%)	Ca	Exchangeable Cations (me./100g. of soil)					Base Satur ation (%)
						Mg	K	H	Al*	Total**	
ELIOAK FINE SANDY LOAM (122)											
A1	0-1	3.80	5.37	7.45	0.13	0.07	0.12	16.84	6.01	17.16	1.86
A2	1-9	4.30	6.34	2.37	0.06	0.04	0.09	8.36	3.00	8.55	2.22
B1	9-12	4.30	5.85	0.78	0.03	0.00	0.09	6.96	2.98	7.08	1.69
B2t	12-26	4.50	3.90	0.52	0.07	0.37	0.19	10.35	4.54	10.98	5.74
B3t	26-36	4.68	4.88	0.09	0.07	0.12	0.09	8.79	4.24	9.07	3.09
C	36-50	4.62	5.37	0.09	0.03	0.04	0.05	2.98	1.54	3.10	3.87
EUBANKS FINE GRAVELLY LOAM (244)											
A1	0-1	4.10	1.46	8.64	0.10	0.16	0.18	13.69	3.50	14.13	3.11
A2	1-9	4.40	0.49	1.82	0.19	0.08	0.10	6.68	1.83	7.05	5.25
B1t	9-14	4.50	0.49	0.52	0.10	0.30	0.11	7.99	2.91	8.50	6.00
B2t	14-33	4.70	0.98	0.13	0.03	0.53	0.13	9.03	2.61	9.72	7.10
B3t	33-45	4.70	0.98	0.07	0.00	0.11	0.07	6.81	2.24	6.99	2.58
C	45-76	4.60	0.49	0.04	0.00	0.15	0.06	5.93	2.34	6.14	3.42
GLENELG LOAM (22)											
A1	0-1	4.00	2.93	8.00	0.09	0.09	0.15	15.11	4.25	15.44	2.14
A2	1-8	4.30	2.93	2.45	0.04	0.06	0.12	9.24	2.61	9.46	2.33
B1t	8-11	4.30	1.95	1.17	0.01	0.07	0.12	9.70	3.70	9.90	2.02
B2t	11-28	4.88	1.95	0.40	0.06	0.84	0.14	9.86	2.77	10.90	9.54
B3	28-33	4.90	1.46	0.27	0.02	0.28	0.12	7.87	2.61	8.29	5.07
C	33-65	4.70	1.46	0.19	0.02	0.12	0.06	4.84	2.07	5.04	3.97
HAZEL LOAM (121)											
Ap	0-8	6.20	10.24	1.35	3.42	1.29	0.32	4.84	0.08	9.87	50.96
B	8-14	6.02	1.95	0.79	3.03	1.34	0.21	5.04	0.10	9.62	47.61
C	14-38	4.98	3.41	0.11	0.50	0.38	0.19	4.84	1.02	5.91	18.10

* Not included in the summation of exchangeable cations

** Summation of exchangeable cations

SOIL CHEMICAL DATA

Hor izon	Depth (in.)	pH	Truog P (ppm)	Organic Matter (%)	Exchangeable Cations (me./100g. of soil)						Base Satur ation (%)
					Ca	Mg	K	H	Al*	Total**	
HIWASSEE LOAM (94)											
A1	0-1	4.00	2.93	10.02	0.12	0.22	0.34	21.96	4.05	22.64	3.00
A2	1-9	4.50	0.98	2.46	0.01	0.04	0.21	11.23	2.47	11.49	2.26
B21t	9-60	4.90	5.37	0.14	0.00	0.90	0.32	12.50	3.11	13.72	8.89
B22t	60-82	5.00	6.83	0.06	0.11	0.64	0.38	12.89	2.76	14.02	8.06
IIB23t	82-96	4.80	6.34	0.04	0.12	0.01	0.14	10.38	2.78	10.65	2.54
IREDELL SILT LOAM (48)											
Ap	0-7	5.80	4.39	1.44	4.88	1.73	0.11	7.58	0.13	14.30	46.99
B2t	7-20	4.92	0.98	0.46	9.81	9.73	0.29	12.50	1.68	32.33	61.34
B3t	20-32	5.10	0.49	0.23	10.11	16.83	0.34	10.12	1.21	37.40	72.94
C	32-86	5.90	26.83	0.14	9.31	9.73	0.35	5.62	0.46	25.01	77.53
LEWISBERRY SANDY LOAM (173)											
Ap	0-9	6.90	42.93	1.35	3.23	0.68	0.27	2.07	0.03	6.25	66.88
B1t	9-15	5.90	0.98	0.23	2.90	0.83	0.14	2.72	0.06	6.59	58.73
B2t	15-27	4.80	1.95	0.23	2.85	1.14	0.13	5.40	1.25	9.52	43.28
C	27-45	4.60	1.46	0.06	0.34	3.11	0.21	5.98	1.99	9.64	37.97
LLOYD FINE SANDY LOAM (235)											
Ap	0-9	6.62	11.71	1.73	4.17	0.72	0.25	4.06	0.06	9.20	55.87
B21t	9-25	6.62	2.44	0.49	5.19	0.69	0.13	5.53	0.01	11.54	52.08
B22t	25-42	5.98	3.90	0.10	3.86	1.02	0.18	7.13	0.08	12.19	41.51
B3	42-48	5.10	1.46	0.06	0.69	0.43	0.23	7.51	1.50	8.86	15.24
C1	48-63	5.20	2.44	0.06	0.38	0.38	0.23	6.40	1.94	7.39	13.40
C2	63-84	5.00	1.46	0.04	0.08	0.17	0.16	4.95	1.72	5.36	7.65
LOUISBURG SANDY LOAM (26)											
A1	0-2	5.92	8.78	5.77	6.92	1.24	0.50	7.30	0.12	15.96	54.26
A2	2-12	5.22	1.46	0.60	0.97	0.16	0.09	4.04	0.76	5.26	23.19
C	12-22	5.00	1.46	0.57	0.82	0.34	0.11	4.80	1.08	6.07	20.92

* Not included in the summation of exchangeable cations

** Summation of exchangeable cations

SOIL CHEMICAL DATA

Hor- izon	Depth (in.)	pH	Truog P (ppm)	Organic Matter (%)	Exchangeable Cations (me./100g. of soil)						Base Satur- ation (%)
					Ca	Mg	K	H	Al*	Total**	
MANOR SILT LOAM (21)											
Ap	0-9	5.78	36.10	0.56	1.88	0.46	0.15	2.44	0.11	4.93	50.51
B	9-19	6.42	8.29	0.49	1.85	0.69	0.11	2.15	0.09	4.80	55.21
C	19-52	5.00	3.90	0.03	0.49	0.59	0.09	2.76	0.61	3.93	29.77
MAYODAN FINE SANDY LOAM (69)											
A1	0-2	5.10	3.41	4.25	1.40	0.35	0.17	8.85	0.70	10.77	17.83
A2	2-11	5.00	2.93	1.54	0.37	0.14	0.06	6.26	1.05	6.83	8.35
B1t	11-16	5.10	2.93	0.52	1.02	0.44	0.13	5.82	1.29	7.41	21.46
B21t	16-33	5.00	3.41	0.30	0.72	1.71	0.29	6.81	2.70	9.53	28.54
B22t	33-42	4.90	4.39	0.27	0.22	1.56	0.30	14.64	5.76	16.72	12.44
B3	42-55	5.70	0.49	0.30	0.00	0.62	0.16	16.73	8.05	17.51	4.45
C	55-91	4.50	0.98	0.08	0.08	0.32	0.12	14.72	9.04	15.24	3.41
MEADOWVILLE LOAM (51)											
Ap	0-11	5.70	4.88	1.01	1.35	0.39	0.04	3.00	0.12	4.78	37.24
B1t	11-18	5.20	1.95	1.11	0.86	0.57	0.06	6.46	0.86	7.95	18.74
B21t	18-33	5.18	0.98	0.32	1.05	0.45	0.08	4.92	0.89	6.50	24.31
B22t	33-42	4.90	0.98	0.18	0.66	12.8	0.23	9.52	3.20	11.69	18.56
IIB3t	42-53	4.80	0.98	0.14	0.41	1.16	0.23	10.30	3.54	12.10	14.88
IIC	53-78	4.68	0.49	0.05	0.12	0.80	0.23	8.26	4.02	9.41	12.22
PENN LOAM (73)											
Ap	0-9	6.70	47.80	7.70	10.07	4.90	0.65	9.75	0.02	25.37	61.57
B2t	9-14	6.50	13.66	3.04	5.43	1.40	0.70	9.31	0.02	16.84	44.71
PORTERS VERY STONY LOAM (109)											
A1	0-4	6.00	109.76	8.89	10.90	7.69	0.90	20.15	0.09	39.64	49.17
A2	4-14	4.90	79.02	3.42	0.53	0.18	0.19	21.02	2.21	21.92	4.11
B2t	14-29	4.88	100.00	0.86	0.28	0.18	0.17	13.91	2.10	14.54	4.33
B3	29-36	4.88	141.95	0.25	0.55	0.64	0.29	13.24	3.50	14.72	10.05
C	36-56	4.80	15.61	0.18	0.24	0.16	0.27	7.35	3.06	8.02	8.35

* Not included in the summation of exchangeable cations

** Summation of exchangeable cations

SOIL CHEMICAL DATA

Hor- izon	Depth (in.)	pH	Truog P (ppm)	Organic Matter (%)	Exchangeable Cations (me./100g. of soil)						Base Satur- ation (%)
					Ca	Mg	K	H	Al*	Total**	
RAPIDAN SILT LOAM (86)											
Ap	0-9	6.52	29.27	2.19	7.80	1.55	0.56	4.80	0.07	14.71	67.37
B2t	9-25	6.40	0.98	0.46	7.90	2.41	0.20	5.97	0.05	16.48	63.77
B3t	25-36	4.50	0.98	0.09	1.62	2.67	0.23	13.97	5.32	18.49	24.45
C	36-69	4.32	2.44	0.30	0.86	2.57	0.24	15.50	8.10	19.17	19.14
STARR SILT LOAM (6)											
Ap	0-13	6.52	29.76	3.04	6.03	1.20	0.15	10.46	0.06	17.84	41.37
B1t	13-27	5.62	20.49	1.85	2.97	0.61	0.05	12.85	0.16	16.48	22.03
B2t	27-40	5.72	13.17	0.77	2.95	0.88	0.21	9.91	0.11	13.95	28.96
B3t	40-52	5.60	3.41	0.55	2.70	2.12	0.09	8.89	0.08	13.80	35.58
IIC	52-72	5.58	27.80	0.41	4.70	3.40	0.22	9.15	0.18	17.47	47.62
THURMONT LOAM (99)											
A1	0-1	5.00	20.49	6.32	4.21	1.62	0.39	13.40	0.52	19.62	31.70
A2	1-9	4.76	5.85	1.62	0.14	0.58	0.22	8.60	2.00	9.54	9.85
B1t	9-14	4.80	7.80	0.78	0.15	0.58	0.30	8.02	2.28	9.05	11.38
B21t	14-30	4.90	2.93	0.52	0.14	0.77	0.38	9.36	2.93	10.65	12.11
B22t	30-36	4.90	3.41	0.17	0.01	0.49	0.24	9.21	3.46	9.95	7.44
B3t	36-48	4.78	3.41	0.12	0.02	0.37	0.19	8.08	3.14	8.66	6.70
C	48-60	4.76	3.41	0.12	0.12	0.15	0.13	7.20	2.65	7.60	5.26
TREGO LOAM (118)											
A1	0-3	5.80	8.29	4.49	5.64	0.64	0.14	7.78	0.07	14.20	45.21
A2	3-8	5.62	3.41	2.15	2.27	0.31	0.05	7.78	0.29	10.41	25.26
B2t	8-22	5.10	3.41	0.51	1.57	0.40	0.07	6.26	1.10	8.30	24.58
B2x	22-36	5.30	2.93	0.24	1.81	1.00	0.12	7.13	0.68	10.06	29.13

* Not included in the summation of exchangeable cations

** Summation of exchangeable cations

SOIL CHEMICAL DATA

Hor izon	Depth (in.)	pH	Truog P (ppm)	Organic Matter (%)	Ca	Exchangeable Cations (me./100g. of soil)				Total**	Base Satur- ation (%)
						Mg	K	H	Al*		
TUSQUITEE STONY LOAM (106)											
A1	0-1	5.26	43.90	8.56	4.96	1.03	0.90	22.12	0.80	29.01	23.75
A2	1-10	4.90	31.71	4.13	0.43	0.08	0.45	20.30	2.66	21.26	4.52
B1t	10-15	5.00	50.73	1.62	0.75	0.16	0.21	16.37	2.08	17.49	6.40
B2t	15-30	5.18	64.39	0.57	1.45	0.28	0.18	13.90	1.97	15.81	12.08
B3t	30-42	5.20	78.54	0.58	0.91	0.17	0.14	14.48	1.41	15.70	7.77
UNISON LOAM (141)											
Ap	0-9	6.92	37.56	2.57	7.61	1.20	0.52	5.38	0.08	14.71	63.43
B1t	9-12	5.92	11.71	1.15	5.08	1.09	0.23	8.88	0.11	15.28	41.88
B21t	12-33	5.46	21.46	0.42	5.11	1.28	0.21	10.19	0.26	16.79	39.31
B22t	33-50	5.44	21.95	0.17	3.09	1.13	0.17	8.88	0.20	13.27	33.08
C	50-72	5.00	18.05	0.12	1.62	1.35	0.27	10.04	0.79	13.28	24.40
WATT CHANNERY SILT LOAM (75)											
A1	0-1	5.10	6.34	12.78	4.41	0.45	0.50	11.89	0.45	17.25	31.07
A2	1-8	4.60	0.98	1.46	0.05	0.07	0.19	5.46	1.60	5.77	5.37
B2t	8-14	4.52	0.98	0.81	0.00	0.12	0.15	7.20	2.64	7.47	3.61
B3	14-19	4.62	1.46	0.73	0.09	0.29	0.13	6.85	2.35	7.36	6.93
C	19-30	4.72	1.46	0.41	0.00	0.14	0.08	5.31	2.00	5.53	3.98
WEHADKEE SILT LOAM (5)											
Apg	0-11	5.50	14.15	2.94	7.86	1.73	0.10	12.59	0.15	22.28	43.49
C1g	11-21	5.80	11.22	2.70	8.08	2.45	0.10	10.81	0.07	21.44	49.58
C2g	21-38	5.92	15.61	2.16	7.82	2.87	0.15	7.87	0.05	18.71	57.94
C3g	38-52	6.40	40.00	1.07	8.31	4.53	0.32	5.17	0.01	18.33	71.79
C4g	52-68	6.20	37.56	1.09	6.10	1.73	0.19	3.94	0.00	11.96	67.06

* Not included in the summation of exchangeable cations

** Summation of exchangeable cations

SOIL CHEMICAL DATA

Hor izon	Depth (in.)	pH	Truog P (ppm)	Organic Matter (%)	Exchangeable Cations (me./100 of soil)					Base Satur- ation (%)	
					Ca	Mg	K	H	Al*		Total**
WICKHAM LOAM (89)											
Ap	0-10	5.32	16.10	3.60	3.07	1.03	0.55	13.17	0.44	17.82	26.09
B2t	10-40	5.28	13.66	0.35	5.57	0.91	0.20	8.34	0.18	15.02	44.47
B3t	40-50	4.90	11.71	0.19	3.91	0.94	0.37	9.50	0.72	14.72	35.46
C	50-75	4.90	12.20	0.10	3.79	1.53	0.40	9.44	0.77	15.16	37.73
WORSHAM LOAM (8)											
A1	0-1	4.30	4.39	7.51	0.95	0.74	0.33	15.64	2.96	17.66	11.44
A2	1-7	4.42	1.95	3.28	0.19	0.46	0.22	10.11	2.53	10.98	7.92
B1	7-11	4.58	0.98	1.92	0.16	0.57	0.15	8.16	2.16	9.04	9.73
B2t	11-42	4.90	0.49	0.39	0.30	1.52	0.07	7.17	1.92	9.06	20.86
B3	42-50	5.10	0.49	0.27	0.92	1.74	0.10	5.31	1.60	8.07	34.20
C	50-69	5.10	0.49	0.23	2.03	2.28	0.19	3.42	0.82	7.92	56.82
ZION SILT LOAM (49)											
A1	0-1	4.42	6.34	2.50	1.28	1.12	0.18	14.48	1.59	17.06	15.12
A2	1-9	5.32	0.98	1.03	0.21	0.98	0.02	5.31	0.43	6.52	18.56
Bcn	9-18	5.72	0.98	0.30	0.34	3.00	0.04	5.19	0.24	8.57	39.44
B2t	18-24	6.00	0.98	0.19	1.88	19.74	0.20	8.56	0.06	30.38	71.82
C	24-29	6.32	0.98	0.77	2.00	19.74	0.14	7.10	0.09	28.98	75.50

* Not included in the summation of exchangeable cations

** Summation of exchangeable cations

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GLOSSARY

Alluvium - Sediments deposited on existing land surfaces by flowing water.
The materials are usually mixed or stratified.

Arkosic Sandstone - A sandstone containing appreciable amounts of feldspar.

Base Saturation % - The sum or total of the bases on the soil exchange sites divided by the exchangeable acidity multiplied by 100.

Coarse Fragment - Particles that exceed 2 mm in diameter.

Colluvium - Material which has moved downhill and has accumulated on lower slopes and at the bottom of hills.

Foot Slopes - Sloping areas occurring at the base of higher-lying areas, often referred to as "toe-slopes" when they occur at the end of a ridge.

Gneiss - A banded metamorphic rock with alternating layers of light colored quartz and feldspar and dark colored materials including mica and hornblende.

Granite - Granular rocks composed chiefly of feldspar and quartz, but usually contain mica and some ferromagnesium mineral.

Granodiorite - A granitic rock in which the feldspar portion is chiefly plagioclase or soda-line feldspar, usually containing a higher percentage of dark minerals such as biotite and hornblende.

Greenstone - A basic rock of igneous origin containing considerable epidote, a hydrous calcium aluminum iron silicate.

Horizons - Soil layers resulting from soil formation processes.

Parent Material - Partially weathered rock materials from which soils developed.

Phyllite - A metamorphic rock with finer banding than schist, intermediate between slate and schist.

Schist - A metamorphic rock with distinct cleavage.

Soil Separate - A group of soil particles separated on the basis of size.

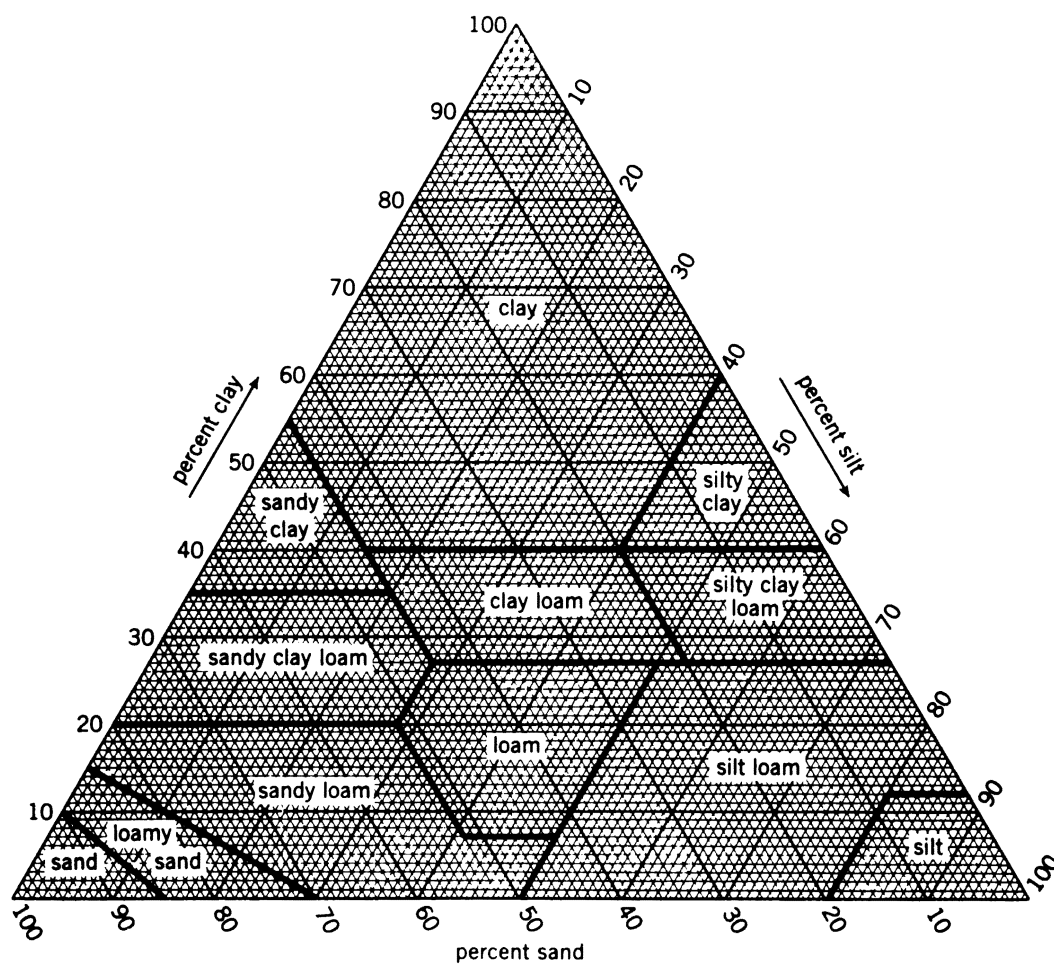
(USDA SYSTEM)

<u>Soil Separate</u>	<u>Particle Diameter mm</u>
Very Coarse sand	2.00-1.00
Coarse Sand	1.00-0.50
Medium Sand	0.50-0.25
Fine Sand	0.25-0.10
Very Fine Sand	0.10-0.05
Coarse Silt	0.05-0.005
Fine Silt	0.005-0.002
Clay	Less than 0.002

Terrace (stream) - An intermediate to high level area of alluvially deposited soil material.

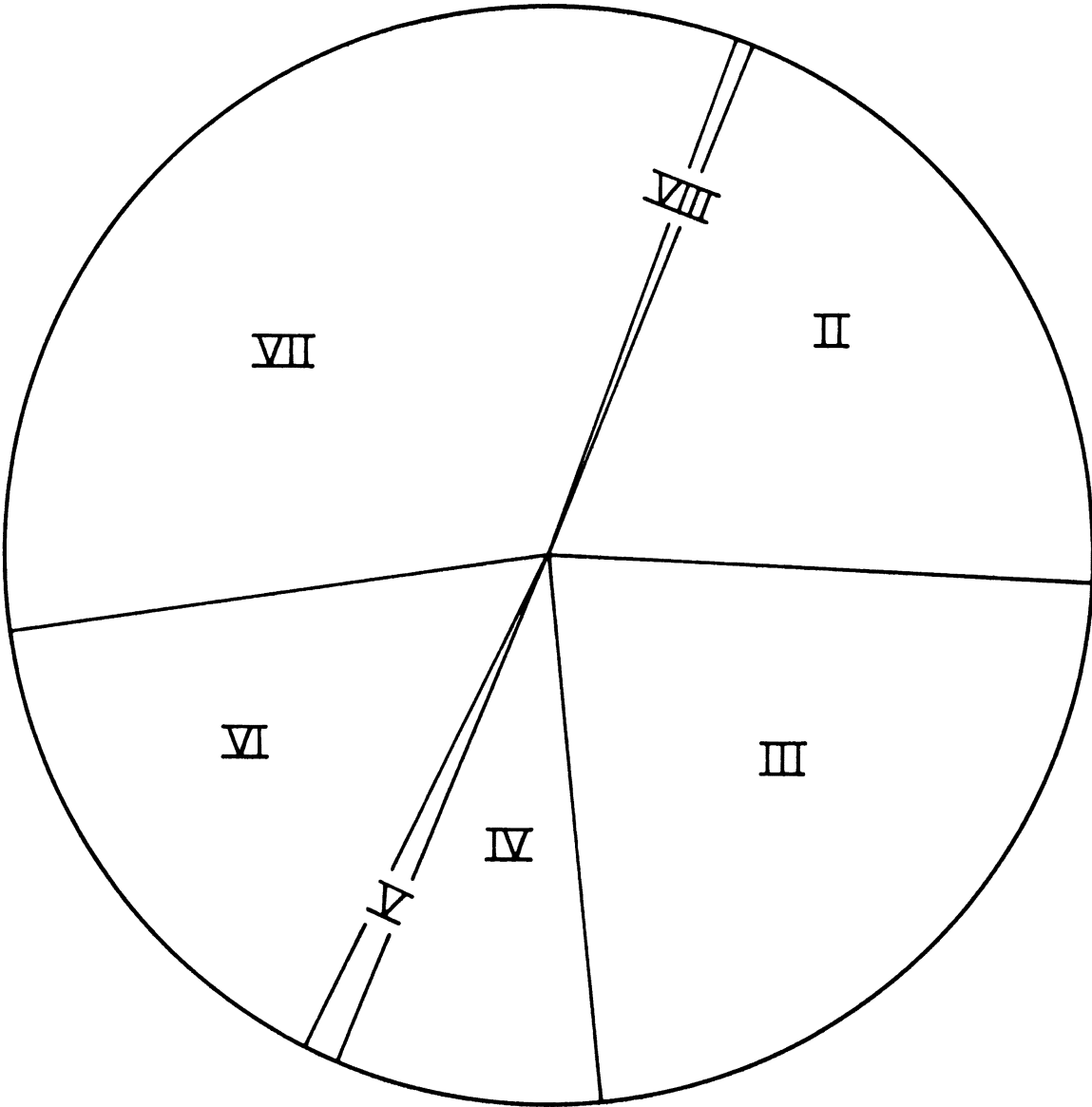
Texture - A soil class based on the relative proportions of sand, silt, and clay size particles.

GUIDE FOR TEXTURAL CLASSIFICATION



Soil Separate	Particle Diameter mm
Very Coarse Sand	.2.00-1.00
Coarse Sand	.1.00-0.50
Medium Sand	.0.50-0.25
Fine Sand	.0.25-0.10
Very Fine Sand	.0.10-0.05
Silt	.0.05-0.002
Clay	.Less Than 0.002

LAND CAPABILITY CLASS DISTRIBUTION OF SOILS IN MADISON COUNTY



<u>LAND CAPABILITY CLASS</u>	<u>PERCENT OF COUNTY</u>
II	19.7
III	22.7
IV	8.0
V	1.0
VI	15.4
VII	32.7
VIII	0.5

COVER: Madison County Courthouse, Madison, Virginia