

U.S. Department of Agriculture
Forest Service Research Paper SO-138

**Chemical and Physical Properties of
Cumberland Plateau and
Highland Rim Forest Soils**

*JOHN K. FRANCIS
AND
NELSON S. LOFTUS*

**Southern
Forest
Experiment
Station**

The logo for the Southern Forest Experiment Station features a stylized triangle with a smaller triangle inside it, positioned to the right of the text.

Summary

Soil descriptions and chemical and physical data for a number of soils of the Cumberland Plateau, eastern Highland Rim, and western Highland Rim areas of Tennessee are presented.

Chemical and Physical Properties of Cumberland Plateau And Highland Rim Forest Soils

JOHN K. FRANCIS AND NELSON S. LOFTUS

Introduction

The Sewanee Silviculture Laboratory is conducting extensive trials to determine how well certain tree species will grow on several Cumberland Plateau and Highland Rim forest sites. A corollary objective is to determine what soil factors limit or promote tree growth on these sites. As a part of this research, soil morphology and site characteristics were recorded at each site and samples were taken from each soil horizon for physical and chemical analysis. A typical profile description and average chemical and physical data are presented in this paper.

Little soil analysis data has been available for the Cumberland Plateau-Highland Rim area. Until now, the most significant soils data pertinent to the area were *Soil Survey Laboratory Data and Descriptions for Some Soils of Tennessee* (USDA 1967), which contains profile descriptions and physical and chemical data for some of the soils of the Plateau-Rim area. The soil surveys, though many are rather old, are another important source, containing soil descriptions and some physical data, as well as being the standard source of soil maps. Other useful sources of related soil data are Peters and others (1970), Longwell and others (1963), and Edwards and others (1974).

Our data, though the most comprehensive now available, have certain limitations. Because the soil pits were located in plots established for site

evaluation, the soil series encountered was usually by chance. As a result not all important forested soil series in the area were represented, and the number of observations per soil series varies. Also, the observations are not evenly distributed among the physiographic provinces. In this paper, soil series of the eastern Rim are separated from those of the western Rim when in reality considerable overlap occurs. Certain profiles should have been classified into families in which no suitable series has been established. Therefore, they were placed in an established series which they resembled closely.

Geography of Study Area

The Cumberland Plateau, extending from central Kentucky to central Alabama (fig. 1), owes its origin to protection from erosion by a massive sandstone caprock that has maintained the present elevation while surrounding areas have been eroded by dissolution of underlying limestone and sapping of the sandstone cap. This has resulted in a gently rolling topography with gentle bottoms grading to deeply cut streams (fig. 2). Abrupt escarpments mark the edges of the plateau. Parent materials include sandstone, siltstone, and shale. Soils are mostly highly leached Ultisols in siliceous mesic families. Nitrogen, phosphorus, and calcium content is usually less than adequate for best tree growth.

John K. Francis is Research Forester at the Silviculture Laboratory maintained at Sewanee, Tennessee, by the Southern Forest Experiment Station, Forest Service—USDA, in cooperation with the University of the South. Nelson S. Loftus is Assistant Director for Planning and Applications, Southern Forest Experiment Station, Forest Service—USDA, New Orleans, Louisiana.

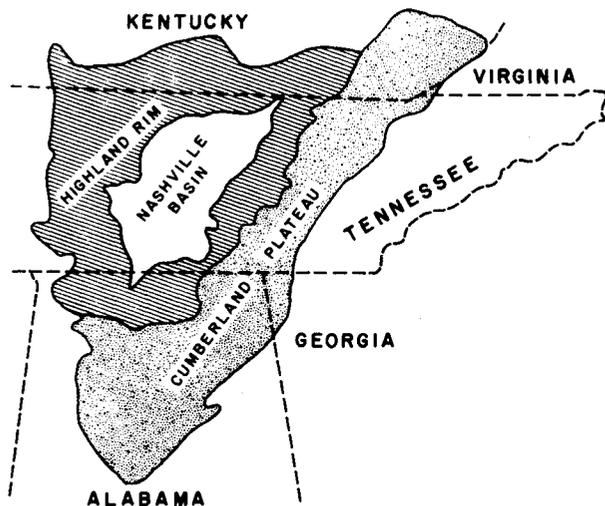


Figure 1.—Location of the Cumberland Plateau and Highland Rim physiographic provinces.

The Cumberland Plateau has warm summers and cool winters and receives about 54 inches of rainfall. This climate fosters a mixed mesophytic forest dominated by oak species. Most of the Plateau area in Tennessee remains forested. The majority of the timber holdings are cut over periodically, with only a few areas judiciously managed for sustained yield of forest products.

The Highland Rim is a broad peneplane that rings the somewhat lower Nashville Basin. The present level of the Highland Rim resulted from erosion of the overlying limestone and sandstone. Most of the area has a highly siliceous limestone or chert residuum underlying the soil mantle. Soils are mostly highly leached Ultisols of the

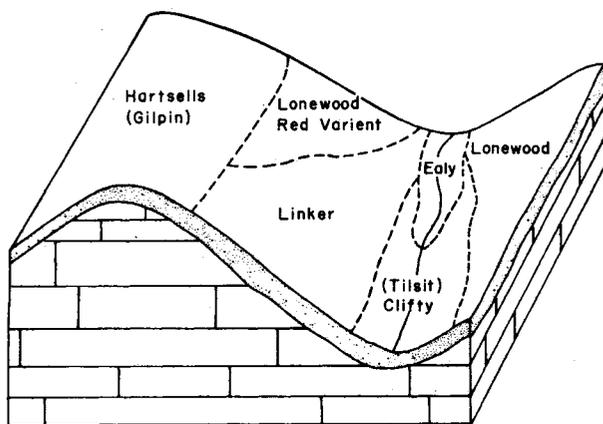


Figure 2.—Soil series-landscape relationships of the Cumberland Plateau. (Soils in parenthesis occur over siltstone rather than sandstone parent material.)

siliceous thermic families. Summers are warm, winters mild, and annual rainfall is about 52 inches per year. The Highland Rim is divided into two physiographic subdivisions: the eastern Highland Rim and the western Highland Rim.

The eastern Rim has a gently undulating topography (fig. 3) with mostly loamy soils and some silty areas. Part of the area is occupied by fairly productive soils of a reddish hue, and part, including the area from which our samples came, is covered by silty, light-colored, relatively infertile soils, usually with fragipans in their subsoils. The forest of the eastern Rim is western mesophytic dominated by oak species. Most of the eastern Rim has been cleared for annual cropping or pasture, and forest holdings are usually wood-lot in size with little modern timber management.

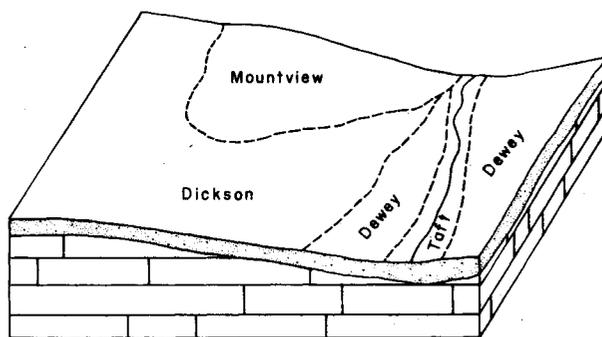


Figure 3.—Soil series-landscape relationships of the eastern Highland Rim.

The western Rim is somewhat more dissected than the eastern Rim (fig. 4). The soils contain more calcium and magnesium, suggesting that the soils of the western Rim are younger than either the eastern Rim or the Cumberland Plateau. The western Rim has the same forest species as the eastern Rim, but much more of it is forested.

Methods

Fifty-six soil sampling pits were established on the Cumberland Plateau, 34 on the eastern Rim, and 24 on the western Rim. The pits are in Bledsoe, Franklin, Hickman, Marion, and Stewart Counties in Tennessee. Soil descriptions were taken according to procedures of the Soil Conservation Service (1951). Field determinations of texture, rather than the separate laboratory determinations presented in the tables, were used in preparing the description. The classification of the soil series presented here has been verified by the Soil Conservation Service.

Results and Conclusion

Seventeen soil series found in forested areas of the Cumberland Plateau, eastern and western Highland Rim areas of Tennessee are represented by a typifying profile description followed on the facing page by a table of chemical and physical data (tables 1-17). The organic carbon, carbon to nitrogen ratio, and total porosity value can be calculated from the data presented. Per acre profile content of several important nutrients is listed (table 18).

These forest soils data can help a land manager assess the ability of a soil to fill a specific need. For example, a soil with a shallow fragipan may be good for growing pine, but poor for growing high value hardwoods. A landuser often knows the soil requirements of his intended use but not the properties of a soil he hopes will fill those needs. If the landuser can identify a soil series, the data we have presented provide him with chemical and physical information about that soil series as it occurs on the Cumberland Plateau and Highland Rim.

Literature Cited

- Beckman Instruments Corp.
1964. Beckman preliminary instructions, No. 1291. 94 p., Fullerton, Calif.
- Bremner, J. M.
1965. Total nitrogen. *In* Methods of soil analysis, Part II, Monogr. 9. Amer. Soc. Agron., p. 1149-1178.
- Day, P. R.
1965. Particle fractionation and particle-size analysis. *In* Methods of soil analysis, Part I, Monogr. 9. Amer. Soc. Agron., p. 545-567.
- Edwards, M. J., J. A. Elder, and M. E. Springer.
1974. The soils of the Nashville Basin. U.S. Dep. Agric., Soil Conserv. Serv. Bull. 499, 125 p.
- Jackson, M. L.
1958. Soil chemical analysis., p. 159-162, 219-222. Prentice-Hall, Inc., Englewood Cliffs.
- Longwell, T. J., W. L. Parks, and M. E. Springer.
1963. Moisture characteristics of Tennessee soils. Univ. of Tenn. Agric. Exp. Stn. Bull. 367, 46 p. Knoxville.
- McLean, E. O.
1965. Aluminum. *In* Methods of soil analysis, Part II, Monogr. 9. Amer. Soc. Agron., p. 978-998.

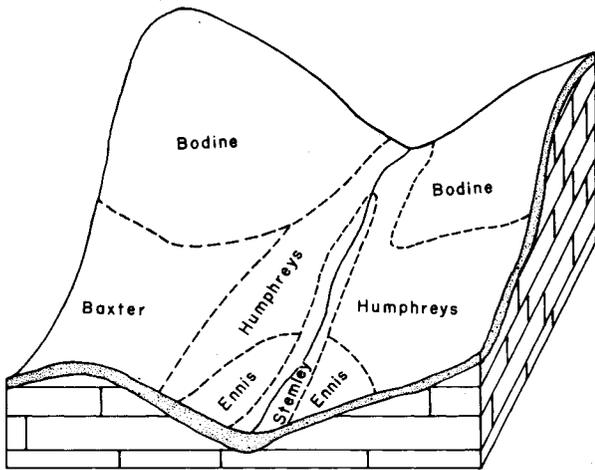


Figure 4.—Soil series-landscape relationships of the western Highland Rim.

Undisturbed core samples were taken for all horizons below the A1 except where it proved impossible because the soil was too loose or too stony. Disturbed samples were taken for all horizons. Bulk density was determined from the undisturbed cores. Field capacity moisture retention was measured with undisturbed cores drained under 1/3 Bar pressure on a ceramic plate. Permanent wilting point moisture retention was measured by draining a disturbed sample under 15 Bar pressure on a pressure membrane. Texture analysis was by the revised Bouyoucos hydrometer method (Day 1965).

Total nitrogen was determined by the macro-Kjeldahl procedure (Bremner 1965), available phosphorus was colorimetrically determined by a 1N ammonium fluoride extraction (Jackson 1958) and organic matter was determined by the potassium dichromate method (Jackson 1958). A glass electrode and pH meter were used to obtain a 1:1 soil in water pH reading. Exchangeable aluminum and hydrogen were determined by titration with sodium hydroxide and back titration with potassium fluoride (McLean 1965). Exchangeable basic cations were extracted by 1N ammonium acetate at pH 7: calcium and magnesium were determined by the atomic absorption technique (Perkin Elmer Corp. 1968) and exchangeable potassium and sodium by flame photometry (Beckman Instruments Corp. 1964). Cation exchange capacity (CEC) was obtained by the sum of cations and base saturation by dividing total cations by CEC.

Perkin Elmer Corp.

1968. Analytical methods for atomic absorption spectrophotometry. 462 p. Perkin Elmer, Norwalk, Conn.

Peters, L. N., D. F. Grigal, J. W. Curlin, and W. J. Selvidge.

1970. Walker branch watershed project: Chemical, physical and morphological properties of the soils of Walker Branch Watershed. ORNL-TM-2968, 96 p. Oak Ridge National Laboratory.

U.S. Department of Agriculture, Soil Conservation Service.

1951. Soil survey manual. U.S. Dep. Agric., Agric. Handb. 18, 503 p.

U.S. Department of Agriculture, Soil Conservation Service.

1967. Soil survey laboratory data and description for some soils of Tennessee. Soil Surv. Invest. Rep. 15, 241 p.

CUMBERLAND PLATEAU PHYSIOGRAPHIC PROVINCE

CLIFTY SERIES

Classification: Fine-loamy, mixed*, mesic Fluventic Dystrochrepts

Typical Profile:

- A1 -- 0-3" -- Very dark brown (10 YR 2/2) loam; weak medium granular structure; loose; abundant fine and medium roots; very strongly acid; abrupt wavy boundary. (2 to 8 inches thick)
- A2 -- 3-10" -- Grayish brown (10 YR 5/2) silt loam; weak medium subangular blocky structure; very friable; abundant fine and medium few large roots; very strongly acid; clear wavy boundary. (0 to 15 inches thick)
- B1 -- 10-22" -- Dark yellowish brown (10 YR 4/4) silt loam; weak medium subangular blocky structure; very friable; plentiful medium, few large roots; thin discontinuous clay films on ped faces; very strongly acid; clear wavy boundary. (0 to 14 inches thick)
- B21 -- 22-33" -- Yellowish brown (10 YR 5/4) loam; moderate medium and coarse subangular blocky structure; friable; few medium roots; common thin clay films on ped faces; very strongly acid; clear wavy boundary. (6 to 15 inches thick)
- B22 -- 33-41" -- Yellowish brown (10 YR 5/5) sandy loam; few medium distinct pale brown (10 YR 6/3) mottles; moderate medium and coarse angular blocky structure; friable; few fine and medium roots; common thin clay films on ped faces; very strongly acid; clear wavy boundary. (0 to 22 inches thick)
- C -- 41-60" -- Yellowish brown (10 YR 5/6) gravelly sandy loam; common medium distinct light gray (10 YR 7/2) and pale brown (10 YR 6/3); few medium distinct reddish brown (5 YR 5/3) mottles; weak fine and medium subangular blocky structure; very friable; about 20 percent coarse fragments; very strongly acid; abrupt wavy boundary. (6 to 42 inches thick)

* Based on associated soils and parent materials, these soils would not be expected to have enough weatherable minerals for the mixed family. Thus they are siliceous taxadjuncts to the Clifty Series.

Table 1.--Chemical and physical properties of 13 profiles of the Clifty Series

Horizon	Exchangeable				Cation
	K	Mg	Ca	Al	Exchange Capacity
----- Meq per 100g -----					
A1 average	.98	.49	1.64	2.49	6.45
A1 range	.63-1.40	.18-1.10	.34-4.30	1.03-3.50	4.68-9.43
A2 average	.74	.11	.22	2.40	4.05
A2 range	.18-1.19	.06-.20	.14-.35	1.62-3.01	2.86-4.66
B1 average	.18	.13	.26	2.60	3.68
B1 range	.09-.59	.04-.31	.10-.28	1.77-3.24	2.34-4.54
B21 average	.13	.19	.20	2.86	3.90
B21 range	.10-.17	.06-.46	.13-.30	1.83-3.75	2.79-5.13
B22 average	.12	.17	.21	3.17	4.07
B22 range	.09-.15	.11-.23	.10-.29	2.27-4.41	3.16-5.39
C average	.09	.16	.19	2.72	3.55
C range	.05-.14	.09-.25	.08-.34	2.16-3.39	2.86-4.61

Horizon	Base	Organic	Total	Available	pH
	Saturation	Matter	N	P	
----- Percent ----- ppm					
A1 average	48	10.3	.28	9.33	4.9
A1 range	31-78	7.3-13.6	.20-.48	5.25-22.75	4.7-5.3
A2 average	31	2.7	.11	.64	5.0
A2 range	21-38	1.5-3.5	.07-.13	.35-1.05	4.7-5.3
B1 average	16	1.4	.08	.86	5.1
B1 range	9-44	.5-2.9	.04-.12	.35-1.75	4.8-5.3
B21 average	15	.9	.06	.51	5.1
B21 range	10-22	.4-1.9	.04-.09	<.14-1.05	4.8-5.4
B22 average	13	.6	.05	.41	5.1
B22 range	9-17	.3-1.2	.04-.07	<.14-1.05	4.8-5.3
C average	13	.5	.05	.41	5.1
C range	10-18	.1-1.5	.03-.08	<.14-.70	4.8-5.4

Horizon	Moisture Holding Capacity			Bulk		
	Sand	Silt	Clay	1/3 Bar	15 Bar	Density
----- Percent ----- Percent by Weight ----- g/cm ³						
A1 average	39	42	19	---	16.0	---
A1 range	26-50	32-52	14-22	---	9.2-30.1	---
A2 average	28	46	26	30.5	8.6	1.15
A2 range	16-48	30-56	20-34	24.3-38.1	6.4-11.3	1.02-1.39
B1 average	27	45	28	26.3	8.7	1.26
B1 range	16-58	22-56	20-32	17.5-34.3	6.4-10.7	1.12-1.43
B21 average	28	43	29	25.0	9.0	1.45
B21 range	16-46	30-54	20-34	17.5-31.5	6.5-11.5	1.25-1.63
B22 average	35	38	27	22.0	8.3	1.61
B22 range	20-46	28-48	20-32	17.0-29.2	6.5-9.8	1.45-1.76
C average	45	32	23	20.2	7.1	1.67
C range	22-60	22-46	16-32	16.0-30.2	5.5-9.8	1.38-1.78

EALY SERIES

Classification: Coarse-loamy, siliceous, mesic Fluventic Dystrochrepts

Typical Profile:

- A1 -- 0-2" -- Dark brown (10 YR 3/3) silt loam; weak fine granular structure; loose; abundant fine and medium roots; strongly acid; clear smooth boundary. (2 to 3 inches thick)
- A2 -- 2-6" -- Dark yellowish brown (10 YR 4/4) silt loam; weak fine and medium subangular blocky structure; very friable; abundant fine and medium, few coarse roots; 5 to 10 percent chert fragments; strongly acid; clear wavy boundary. (3 to 5 inches thick)
- B2 -- 6-17" -- Yellowish brown (10 YR 5/6) silt loam; weak medium and coarse subangular blocky structure; very friable; abundant fine and medium, few coarse roots; thin discontinuous clay films on ped faces; about 3 percent chert fragments; strongly acid; gradual wavy boundary. (9 to 11 inches thick)
- C -- 17-38" -- Strong brown (7.5 YR 5/8) sand; weak medium subangular blocky structure; loose; few fine and medium roots; 20 to 40 percent chert fragments; strongly acid. (16 to 23 inches thick)
- R -- 38" -- Acid sandstone.

Table 2.--Several chemical and physical properties of 1 profile of the Ealy Series

Horizon	Exchangeable				Cation
	K	Mg	Ca	Al	Exchange Capacity
	----- Meq per 100g -----				
A1	.86	.46	3.28	.46	5.47
A2	.76	.08	.25	1.06	2.44
B2	.09	.10	.40	1.15	1.91
C	.05	.14	.35	.82	1.53

Horizon	Base	Organic	Total	Available	pH
	Saturation	Matter	N	P	
	----- Percent -----			ppm	
A1	87	7.2	.21	8.05	5.5
A2	50	2.6	.10	1.05	5.1
B2	32	1.1	.07	1.05	5.2
C	37	.7	.07	2.45	5.3

Horizon	Sand	Silt	Clay	Moisture Holding Capacity		Bulk
				1/3 Bar	15 Bar	Density
	----- Percent -----			Percent by Weight		g/cm ³
A1	56	30	14	---	14.7	---
A2	44	36	20	19.2	5.9	1.21
B2	60	22	18	13.5	4.8	1.30
C	78	12	10	---	3.0	---

LONEWOOD SERIES, RED VARIANT

Classification: Fine-loamy, siliceous, mesic Typic Hapludults

Typical Profile:

- A1 -- 0-4" -- Dark grayish brown (10 YR 4/2) sandy loam; weak coarse and very coarse granular; very friable; abundant fine, plentiful medium roots; 3 percent coarse fragments; very strongly acid; clear wavy boundary. (2 to 4 inches thick)
- A2 -- 4-11" -- Yellowish brown (10 YR 5/4) sandy loam; weak medium and coarse subangular blocky structure; abundant fine, plentiful medium roots; 2 percent coarse fragments; very strongly acid; clear wavy boundary. (3 to 9 inches thick)
- B21t -- 11-19" -- Yellowish red (5 YR 4/6) sandy clay loam; moderate fine and medium subangular blocky structure; friable; abundant fine, plentiful medium roots; thin patchy clay films on ped faces; 1 percent coarse fragments; strongly acid; clear wavy boundary. (0 to 10 inches thick)
- B22t -- 19-31" -- Yellowish red (5 YR 4/8) sandy clay loam; strong medium, coarse and very coarse angular blocky structure; friable; plentiful fine and medium roots; thin common clay films on ped faces; 1 percent coarse fragments; strongly acid; gradual wavy boundary. (7 to 15 inches thick)
- B23t -- 31-42" -- Red (2.5 YR 4/6) sandy loam; strong medium, coarse and very coarse angular blocky structure; friable; plentiful fine roots; moderately thick common clay films on ped faces; strongly acid; gradual wavy boundary. (0 to 15 inches thick)
- B3 -- 42-68" -- Red (2.5 YR 4/8) loamy sand; moderate medium and coarse subangular blocky structure; friable; few fine roots; thin patchy clay films on ped faces; strongly acid; abrupt wavy boundary. (20 to 26 inches thick)
- R -- 68" -- Partially weathered acid sandstone.

Table 3.--Chemical and physical properties of 2 profiles* of the Lonewood, Red Variant

Horizon	Exchangeable				Cation
	K	Mg	Ca	Al	Exchange Capacity
----- Meq per 100g -----					
A1 average	.89	.27	1.05	1.60	4.46
A2 average	.56	.09	.26	1.28	2.48
B21t average	.17	.42	.41	4.38	5.90
B22t average	.17	.83	.27	4.55	6.65
B23t average	.12	.29	.13	4.00	5.60
B3 average	.08	.14	.11	3.22	4.44

Horizon	Base	Organic	Total	Available	pH
	Saturation	Matter	N	P	
----- Percent -----				ppm	
A1 average	52	11.0	.11	5.78	4.8
A2 average	41	1.9	.05	1.92	5.0
B21t average	18	.7	.05	.14	5.0
B22t average	20	.4	.04	.14	5.2
B23t average	12	.2	.04	.28	5.4
B3 average	10	.3	.03	.21	5.4

Horizon	Sand	Silt	Clay	Moisture Holding Capacity		Bulk
				1/3 Bar	15 Bar	Density
----- Percent -----			Percent by Weight		g/cm ³	
A1 average	55	29	16	---	7.6	---
A2 average	50	31	19	17.8	4.8	1.34
B21t average	42	27	34	20.9	11.4	1.42
B22t average	43	18	39	25.2	14.3	1.47
B23t average	47	14	39	24.2	14.2	1.60
B3 average	59	5	36	21.2	11.8	1.64

*Range not meaningful

GILPIN SERIES

Classification: Fine-loamy, mixed, mesic Typic Hapludults

Typical Profile:

- A1 -- 0-1" -- Dark grayish brown (10 YR 4/2) silt loam; weak medium granular structure; very friable; plentiful fine roots; 13 percent coarse fragments; extremely acid; clear smooth boundary. (1 to 4 inches thick)
- A2 -- 1-8" -- Yellowish brown (10 YR 5/4) silt loam; moderate medium granular structure; very friable; plentiful fine and medium roots; 1 percent coarse fragments; very strongly acid; clear smooth boundary. (3 to 7 inches thick)
- B21t -- 8-15" -- Yellowish brown (10 YR 5/6) silt loam; moderate medium subangular blocky structure; friable; plentiful fine roots; thin discontinuous clay films on ped faces; 13 percent coarse fragments; very strongly acid; clear smooth boundary. (4 to 11 inches thick)
- B22t -- 15-20" -- Yellowish brown (10 YR 5/6) gravelly silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; common moderately thick clay films on ped faces; about 15 percent coarse fragments; strongly acid; gradual smooth boundary. (5 to 9 inches thick)
- B3 & C -- 20-28" -- Yellowish brown (10 YR 5/4) very gravelly silty clay loam; weak medium subangular blocky structure; friable; more than 50 percent coarse fragments; strongly acid; abrupt smooth boundary. (0-9 inches thick)

Table 4.--Chemical and physical properties of 7 profiles of the Gilpin Series

Horizon	Exchangeable				Cation	
	K	Mg	Ca	Al	Exchange Capacity	
----- Meq per 100g -----						
A1	average	.56	.43	3.39	2.29	6.43
	range	.20-.88	.19-.78	.69-3.64	1.49-3.19	4.02-8.17
A3	average	.31	.06	.15	2.08	2.92
	range	.09-.43	.05-.07	.12-.21	1.58-2.58	2.67-3.70
B21t	average	.26	.13	.34	3.13	4.21
	range	.10-.31	.07-.21	.13-.58	2.42-3.71	3.39-5.42
B22t	average	.24	.31	.37	4.36	5.78
	range	.11-.39	.15-.55	.18-.55	2.94-6.23	4.31-7.36
B3	average	.31	.35	.39	4.98	6.50
	range	.17-.42	.18-.45	.20-.63	2.63-7.72	4.38-9.72
C	average	.25	.24	.23	4.71	6.16
	range	.19-.30	.23-.25	.10-.35	2.21-7.21	4.99-8.33

Horizon	Base	Organic	Total	Available		
	Saturation	Matter	N	P	pH	
----- Percent ----- ppm						
A1	average	48	7.6	.19	6.00	4.6
	range	27-73	4.4-10.7	.12-.26	2.80-9.80	4.4-4.9
A3	average	20	1.5	.06	1.33	5.0
	range	10-24	1.1-2.1	.05-.07	.35-2.10	4.9-5.0
B21t	average	18	.8	.05	approx. .73	5.1
	range	11-24	.4-1.2	.04-.06	<.14-1.4	5.0-5.2
B22t	average	18	.5	.05	approx. .15	5.3
	range	7-28	.4-.8	.03-.06	<.14-.70	5.1-5.4
B3	average	18	.3	.04	<.14	5.4
	range	10-33	.2-.6	.03-.05	<.14-.35	5.2-5.6
C	average	15	.4	.05	<.14	5.4
	range	6-24	.2-.5	.04-.06	---	5.2-5.6

Horizon	Sand	Silt	Clay	Moisture Holding Capacity		Bulk	
				1/3 Bar	15 Bar	Density	
----- Percent ----- Percent by Weight ----- g/cm ³							
A1	average	25	57	16	---	10.2	---
	range	4-40	44-78	12-28	---	7.0-13.8	---
A3	average	23	56	23	24.9	6.0	1.40
	range	16-28	40-62	20-28	22.8-25.5	5.2-6.8	1.33-1.49
B21t	average	24	48	28	23.7	8.9	1.47
	range	16-38	34-56	24-30	22.4-25.7	7.5-9.6	1.40-1.53
B22t	average	28	41	31	24.7	12.1	1.53
	range	18-42	32-46	24-44	23.0-26.4	6.6-17.0	1.36-1.62
B3	average	34	32	33	24.3	13.2	1.56
	range	28-46	22-48	24-42	19.8-30.2	6.2-18.2	1.46-1.68
C	average	32	33	35	---	13.8	---
	range	22-42	28-38	30-40	---	12.7-15.0	---

HARTSELLS SERIES

Classification: Fine-loamy, siliceous, thermic* Typic Hapludults

Typical Profile:

- A1 -- 0-1" -- Dark gray (10 YR 4/1) loam; weak medium granular structure; very friable; abundant fine and medium roots; 3 percent coarse fragments; strongly acid; abrupt smooth boundary. (1 to 4 inches thick)
- A2 -- 1-7" -- Yellowish brown (10 YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; abundant medium and large roots; 4 percent coarse fragments; strongly acid; clear wavy boundary. (3 to 11 inches thick)
- B21 -- 7-17" -- Yellowish brown (10 YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; plentiful medium and large roots; 3 percent coarse fragments; very strongly acid; gradual wavy boundary. (6 to 12 inches thick)
- B22t -- 17-24" -- Yellowish brown (10 YR 5/6) very fine sandy loam; moderate medium and coarse subangular blocky structure; very friable; plentiful medium roots; common thin clay films on ped faces; 2 percent coarse fragments; very strongly acid; gradual wavy boundary. (0 to 13 inches thick)
- C -- 24-31" -- Yellowish brown (10 YR 5/8) sandy loam; moderate medium subangular blocky; friable; few medium roots; thin continuous clay films on ped faces; 10 percent coarse fragments; very strongly acid; abrupt wavy boundary. (0 to 19 inches thick)
- R -- 31" -- Partially weathered acid sandstone.

* These soils have mesic temperatures and are taxadjuncts to the Hartsells Series.

Table 5.--Chemical and physical properties of 15 profiles of the Hartsells Series

Horizon		Exchangeable				Cation
		K	Mg	Ca	Al	Exchange Capacity
		----- Meq per 100g -----				
A1	average	1.08	.56	2.93	1.72	7.07
	range	.66-1.46	.23-.92	.75-6.93	.02-6.30	4.90-11.63
A2	average	.68	.09	.23	1.59	3.07
	range	.31-1.44	.04-.15	.12-.58	.10-2.40	1.33-5.42
B21	average	.13	.16	.28	2.58	3.53
	range	.08-.20	.08-.34	.13-.44	1.30-3.90	1.95-5.16
B22t	average	.12	.35	.22	2.81	3.88
	range	.08-.18	.10-.70	.10-.40	2.05-3.90	2.83-4.87
C	average	.10	.30	.17	2.88	3.92
	range	.05-.18	.12-.52	.07-.31	.14-3.90	1.96-5.62

Horizon		Base	Organic	Total	Available	pH
		Saturation	Matter	N	P	
		----- Percent -----			ppm	
A1	average	67	12.3	.26	14.28	5.0
	range	34-95	6.3-22.1	.15-.44	5.60-22.05	4.4-5.5
A2	average	39	2.7	.08	1.86	5.0
	range	24-71	1.6-4.2	.05-.18	1.05-3.85	4.7-5.3
B21	average	18	.9	.05	.88	4.9
	range	9-36	.5-1.2	.04-.06	.35-1.75	4.7-5.2
B22t	average	19	.5	.04	.50	5.0
	range	15-23	.3-.8	.03-.05	.14-1.75	4.8-5.3
C	average	17	.3	.02	approx. .43	5.2
	range	11-27	.1-.6	.01-.04	<.14-1.54	4.9-5.5

Horizon		Sand	Silt	Clay	Moisture Holding Capacity		Bulk
		Percent	Percent	Percent	1/3 Bar	15 Bar	Density
		----- Percent -----			Percent by Weight		g/cm ³
A1	average	58	24	18	---	14.0	---
	range	44-66	18-32	12-38	---	7.7-24.3	---
A2	average	53	26	21	19.5	5.7	1.29
	range	39-66	18-37	16-26	16.4-24.6	3.6-7.9	1.11-1.43
B21	average	50	25	25	18.0	7.0	1.41
	range	37-60	16-32	20-32	14.3-22.0	4.4-10.5	1.32-1.65
B22t	average	55	21	24	18.3	7.6	1.63
	range	34-64	12-34	20-32	15.5-22.4	5.4-11.4	1.58-1.73
C	average	64	13	23	18.0	7.4	1.73
	range	54-78	8-20	12-34	15.9-20.2	3.3-12.0	1.64-1.83

LINKER SERIES

Classification: Fine-loamy, siliceous, thermic* Typic Hapludults

Typical Profile:

- A1 -- 0-3" -- Dark grayish brown (10 YR 4/2) fine sandy loam; weak medium, coarse and very coarse granular structure; very friable; abundant fine, plentiful medium roots; 12 percent sandstone fragments; very strongly acid; clear wavy boundary. (1 to 4 inches thick)
- A2 -- 3-9" -- Reddish yellow (7.5 YR 6/6) gravelly sandy loam; weak medium subangular blocky structure; very friable; abundant fine, plentiful medium roots; 16 percent sandstone fragments; very strongly acid; clear wavy boundary. (5 to 7 inches thick)
- B21t -- 9-15" -- Strong brown (7.5 YR 5/6) gravelly sandy clay loam; weak medium and coarse subangular blocky structure; friable; abundant fine, few medium roots; thin patchy clay films on ped faces; 15 percent sandstone fragments; very strongly acid; clear wavy boundary (4 to 7 inches thick)
- B22t -- 15-24" -- Yellowish red (5 YR 5/8) sandy clay loam; moderate medium coarse angular blocky structure; friable; plentiful fine, few medium roots; thin common clay films on ped faces; 14 percent sandstone fragments; strongly acid; abrupt wavy boundary. (9 to 20 inches thick)
- B3 -- 24-33" -- Yellowish red (5 YR 4/6) sandy loam; moderate medium platy breaking to moderate medium and coarse angular blocky structure; firm; few fine roots; thin common clay films on ped faces; 1 percent sandstone fragments; medium acid; abrupt wavy boundary. (3 to 10 inches thick)
- R -- 33" -- Acid sandstone.

* These soils have mesic temperatures and are taxadjuncts to the Linker Series.

Table 6.--Chemical and physical properties of 2 profiles* of the Linker Series

Horizon	Exchangeable				Cation
	K	Mg	Ca	Al	Exchange Capacity
----- Meq per 100g -----					
A1 average	1.08	.34	.99	2.08	5.04
A2 average	.81	.13	.14	1.00	2.50
B21t average	.11	.07	.16	2.45	3.24
B22t average	.11	.22	.18	2.48	3.51
B3 average	.05	.23	.14	2.05	2.82

Horizon	Base	Organic	Total	Available	pH
	Saturation	Matter	N	P	
		Percent	ppm		
A1 average	51	10.8	.21	8.22	5.1
A2 average	47	1.4	.06	3.15	5.0
B21t average	17	1.1	.06	.35	4.9
B22t average	22	.8	.04	.21	5.4
B3 average	17	.3	.02	.14	5.5

Horizon	Sand	Silt	Clay	Moisture Holding Capacity		Bulk
				1/3 Bar	15 Bar	Density
			Percent	Percent by Weight		g/cm ³
A1 average	66	22	12	---	10.0	---
A2 average	61	22	17	14.6	4.8	1.41
B21t average	51	20	29	16.3	8.8	1.39
B22t average	53	17	30	18.7	10.3	1.51
B3 average	63	8	29	---	10.1	---

*Range not meaningful

LONEWOOD SERIES

Classification: Fine-loamy, siliceous, mesic Typic Hapludults

Typical Profile:

- A1 -- 0-1" -- Dark grayish brown (10 YR 4/2) loam; weak fine and medium granular structure; loose; abundant fine and medium roots; strongly acid; abrupt smooth boundary. (1 to 5 inches thick)
- A2 -- 1-6" -- Brown (10 YR 4/3) silt loam; moderate medium and coarse subangular blocky structure; friable; abundant fine and medium roots; very strongly acid; clear wavy boundary. (4 to 8 inches thick)
- B1 -- 6-14" -- Yellowish brown (10 YR 5/4) silty clay loam; moderate medium and coarse subangular blocky structure; friable; abundant fine and medium, few large roots; very strongly acid; clear wavy boundary. (5 to 9 inches thick)
- B21t -- 14-24" -- Dark yellowish brown (10 YR 4/4) silty clay loam; strong medium, coarse, and very coarse angular blocky structure; friable; plentiful medium, few large roots; many moderately thick clay films on ped faces; very strongly acid; clear wavy boundary. (5 to 14 inches thick)
- B22t -- 24-33" -- Dark yellowish brown (10 YR 4/4) silty clay loam; strong coarse and very coarse angular blocky structure; firm; plentiful medium, few large roots; many moderately thick clay films on ped faces; strongly acid; clear wavy boundary. (5 to 14 inches thick)
- C -- 33-50" -- Light yellowish brown (10 YR 6/4) sandy loam; few fine distinct yellowish brown (10 YR 5/6) mottles; strong medium, coarse and very coarse angular blocky structure; friable; few fine roots; very strongly acid; gradual wavy boundary. (10 to 42 inches thick)

Table 7.--Chemical and physical properties of 15 profiles of the Lonewood Series

Horizon		Exchangeable				Cation
		K	Mg	Ca	Al	Exchange Capacity
		Meq per 100g				
A1	average	1.01	.73	3.28	1.81	7.29
	range	.69-1.41	.32-1.45	1.26-8.86	.55-2.75	5.16-12.74
A2	average	.64	.10	.22	1.87	3.22
	range	.15-.89	.06-.16	.14-.46	1.21-2.75	2.48-4.22
B1	average	.21	.20	.32	2.47	3.71
	range	.06-.54	.05-.44	.11-.56	1.15-3.95	1.55-5.62
B21t	average	.13	.25	.23	2.96	3.96
	range	.06-.19	.04-.78	.14-.46	1.48-5.10	1.98-6.32
B22t	average	.13	.35	.18	3.17	4.29
	range	.06-.24	.08-.96	.09-.38	1.54-5.45	2.08-6.80
C	average	.12	.21	.18	3.23	4.12
	range	.05-.27	.12-.32	.10-.35	1.97-5.20	2.46-6.36

Horizon		Base	Organic	Total	Available	
		Saturation	Matter	N	P	pH
		Percent				ppm
A1	average	66	13.1	.26	13.73	4.9
	range	43-92	7.8-24.0	.04-.58	7.35-23.80	4.6-5.3
A2	average	34	3.3	.09	1.92	5.0
	range	16-55	1.2-4.6	.06-.18	.70-5.95	4.8-5.3
B1	average	21	1.3	.07	1.14	5.0
	range	16-27	.8-2.4	.05-.09	.42-1.54	4.8-5.2
B21t	average	17	.83	.05	.79	5.0
	range	11-25	.4-1.7	.04-.06	.28-1.40	4.9-5.1
B22t	average	17	.4	.04	.42	5.1
	range	9-33	.1-.6	.02-.05	.14-1.40	4.9-5.4
C	average	14	.2	.02	.46	5.2
	range	9-18	.1-.4	.01-.05	.14-1.40	5.0-5.6

Horizon		Sand	Silt	Clay	Moisture Holding Capacity		Bulk
					1/3 Bar	15 Bar	Density
		Percent			Percent by Weight		g/cm ³
A1	average	51	30	19	---	14.5	---
	range	26-62	14-46	14-36	---	7.6-28.0	---
A2	average	43	34	23	24.1	7.0	1.26
	range	28-58	20-48	20-32	17.7-35.1	4.4-11.8	1.07-1.44
B1	average	39	34	27	20.7	7.8	1.32
	range	28-54	18-42	20-34	18.8-24.2	5.0-9.7	1.17-1.48
B21t	average	43	30	27	20.2	7.9	1.43
	range	28-58	16-42	20-34	16.1-24.8	5.1-11.3	1.20-1.63
B22t	average	46	27	27	19.0	8.2	1.60
	range	30-66	12-44	20-32	14.8-22.4	5.2-11.2	1.44-1.74
C	average	53	21	26	18.5	8.3	1.73
	range	40-68	8-34	16-34	13.7-24.8	6.0-12.8	1.59-1.85

TILSIT SERIES

Classification: Fine-silty, mixed*, mesic Typic Fragiudults

Typical Profile:

- A1 -- 0-2" -- Very dark brown (10 YR 2/2) silt loam; moderate medium granular; very friable; abundant fine roots; 3 percent coarse fragments; very strongly acid; clear smooth boundary.
- A2 -- 2-6" -- Light grayish brown (10 YR 6/2) silt loam; common medium distinct yellowish brown (10 YR 5/6) mottles; weak medium granular structure; very friable; plentiful fine and medium roots; 2 percent coarse fragments; very strongly acid; clear smooth boundary.
- B1 -- 6-13" -- Light yellowish brown (10 YR 6/4) silt loam; weak medium subangular blocky structure; friable; plentiful fine and medium roots; 1 percent coarse fragments; clear smooth boundary.
- B2t -- 13-21" -- Yellowish brown (10 YR 5/6) silt loam; moderate medium subangular blocky structure; firm; plentiful, fine and medium roots; thin patchy clay films on ped faces; 1 percent coarse fragments; strongly acid; clear smooth boundary.
- Bx1 -- 21-29" -- Brown (10 YR 5/3) light grayish brown (10 YR 6/2) and dark brown (10 YR 4/3) silt loam; moderate medium subangular and angular blocky structure; brittle, very firm; thin patchy clay films on ped faces; 3 percent coarse fragments; strongly acid; gradual smooth boundary.
- Bx2 -- 29-55" -- Yellowish brown (10 YR 5/6) dark yellowish brown (10 YR 4/4) and pale brown (10 YR 6/3) silt loam; moderate medium angular blocky structure; brittle, very firm; thin patchy clay films on ped faces; silt flows between peds; 17 percent coarse fragments; strongly acid; gradual smooth boundary.
- R -- 55" -- Acid sandstone bedrock.

* Based on associated soils and parent materials, these soils would not be expected to have enough weatherable minerals for the mixed family. Thus, they are siliceous taxadjuncts to the Clifty Series.

Table 8.--Chemical and physical properties of 1 profile of the Tilsit Series

Horizon	Exchangeable				Cation Exchange Capacity
	K	Mg	Ca	Al	
----- Meq per 100g -----					
A1	.47	.35	1.52	2.53	5.48
A2	.47	.06	.20	2.41	3.33
B1	.26	.14	.36	4.33	5.47
B2t	.37	.36	.52	4.64	6.27
Bx1	.35	.25	.46	4.02	5.50
Bx2	.34	.19	.32	4.17	5.34

Horizon	Base	Organic	Total	Available	pH
	Saturation	Matter	N	P	
----- Percent -----					ppm
A1	44	8.3	.25	3.85	4.8
A2	24	1.9	.06	.70	4.9
B1	15	.9	.05	.35	5.0
B2t	21	.5	.04	.18	5.2
Bx1	21	.2	.02	< .14	5.2
Bx2	15	.1	.02	< .14	5.2

Horizon	Percent			Moisture Holding Capacity		Bulk Density
	Sand	Silt	Clay	1/3 Bar	15 Bar	
----- Percent -----						g/cm ³
A1	26	58	16	---	9.2	---
A2	20	60	20	27.5	4.8	1.41
B1	16	56	28	24.8	8.3	1.49
B2t	22	52	26	24.3	8.1	1.56
Bx1	28	52	20	20.7	---	1.69
Bx2	34	46	20	---	5.6	---

EASTERN HIGHLAND RIM PHYSIOGRAPHIC SUBPROVINCE

DEWEY SERIES

Classification: Clayey, kaolinitic, thermic Typic Paleudults

Typical Profile:

- A1 -- 0-3" -- Dark grayish brown (10 YR 4/2) silt loam; weak fine granular structure; very friable; abundant fine and medium roots; 5 percent coarse fragments; strongly acid; clear wavy boundary. (3 to 4 inches thick)
- A2 -- 3-8" -- Brown (7.5 YR 5/4) silt loam; moderate fine and medium subangular blocky structure; very friable; abundant fine, medium and large roots; 8 percent coarse fragments; strongly acid; clear wavy boundary. (5 to 8 inches thick)
- B1 -- 8-14" -- Yellowish brown (10 YR 5/5) silt loam; moderate fine and medium subangular blocky structure; friable; plentiful fine and medium roots; 8 percent coarse fragments; strongly acid; clear wavy boundary. (6 to 7 inches thick)
- B21t -- 14-21" -- Strong brown (7.5 YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; friable; abundant fine, few medium roots; thin discontinuous clay films on ped faces; 6 percent coarse fragments; strongly acid; gradual smooth boundary. (6 to 8 inches thick)
- B22t -- 21-28" -- Strong brown (7.5 YR 5/6) clay loam; moderate fine and medium angular blocky structure; firm; few medium roots; thin discontinuous clay films on ped faces; 5 percent coarse fragments; strongly acid; gradual smooth boundary. (7 to 11 inches thick)
- B23t -- 28-39" -- Strong brown (7.5 YR 5/6) clay loam; common medium distinct yellowish red (5 YR 5/6) and common medium distinct pale brown (10 YR 6/3) mottles; moderate fine and medium angular blocky structure; firm; few medium roots; common moderately thick clay films on ped faces; 10 percent coarse fragments; strongly acid; abrupt smooth boundary. (11 to 19 inches thick)
- IIB24t -- 39-54" -- Dark red (2.5 YR 3/6) clay; yellowish brown (10 YR 5/6) streaks; moderate fine and medium subangular blocky structure; firm; few medium roots; strongly acid; abrupt smooth boundary. (13 to 16 inches thick)

Table 9.--Chemical and physical properties of 3 profiles* of the Dewey Series

Horizon	Exchangeable				Cation Exchange Capacity
	K	Mg	Ca	Al	
----- Meq per 100g -----					
A1 average	1.46	.37	1.49	.76	4.63
A2 average	.88	.26	.52	1.10	3.30
B1 average	.15	.51	.62	2.41	4.17
B21t average	.16	.72	.41	4.28	6.04
B22t average	.15	.76	.27	6.38	8.28
B23t average	.15	.65	.30	7.38	9.26

Horizon	Base	Organic	Total	Available	pH
	Saturation	Matter	N	P	
		Percent	ppm		
A1 average	77	4.8	.16	4.84	5.2
A2 average	55	1.3	.06	.93	5.2
B1 average	33	.7	.04	.35	5.1
B21t average	23	.4	.03	.35	5.2
B22t average	15	.3	.03	.35	5.4
B23t average	12	.3	.01	.18	5.2

Horizon	Sand	Silt	Clay	Moisture Holding Capacity		Bulk
	Percent			1/3 Bar	15 Bar	Density
				Percent by Weight		g/cm ³
A1 average	18	61	21	8.9		
A2 average	13	58	29	22.7	6.3	1.32
B1 average	11	53	36	24.8	9.7	1.39
B21t average	8	47	46	24.8	13.8	1.50
B22t average	4	44	52	27.8	18.5	1.50
B23t average	6	38	56	31.1	20.2	1.44

*Range not meaningful

DICKSON SERIES

Classification: Fine-silty, siliceous, thermic Glossic Fragiudults

Typical Profile:

- A1 -- 0-2" -- Dark grayish brown (10 YR 4/2) silt loam; weak medium granular structure; very friable; abundant fine roots; 5 percent coarse fragments; strongly acid; abrupt smooth boundary. (2 to 4 inches thick)
- A2 -- 2-6" -- Yellowish brown (10 YR 5/5) silt loam; moderate fine and medium subangular blocky structure; friable; many fine, plentiful medium roots; 4 percent coarse fragments; very strongly acid; clear smooth boundary. (4 to 8 inches thick)
- B1 -- 6-17" -- Yellowish brown (10 YR 5/6) silt loam; moderate fine and medium subangular blocky structure; friable; plentiful fine and medium roots; 9 percent coarse fragments; strongly acid; gradual smooth boundary. (6 to 11 inches thick)
- B2 -- 17-28" -- Yellowish brown (10 YR 5/5) silty clay loam; moderate fine and medium subangular blocky structure; friable; plentiful fine, few medium roots; strongly acid; clear wavy boundary. (4 to 11 inches thick)
- B'x1 -- 28-42" -- Pale brown (10 YR 6/3) silty clay loam; common medium distinct reddish brown (5 YR 4/4) and light gray (10 YR 6/1) mottles; moderate coarse platy, moderate fine and medium angular blocky structure; brittle and firm; strongly acid; gradual wavy boundary. (7 to 14 inches thick)
- B'x2 -- 42-54" -- Yellowish brown (10 YR 5/4) and reddish brown (5 YR 4/4) clay loam; moderate coarse platy and moderate fine and medium angular blocky; firm; veins of clay between peds; strongly acid; gradual wavy boundary. (6 to 12 inches thick)
- IIB'2t -- 54-65" -- Yellowish red (5 YR 4/6) clay; common medium distinct light brownish gray (10 YR 6/2) to light yellowish brown (10 YR 6/4) mottles; moderate medium angular blocky structure; very firm; strongly acid; abrupt wavy boundary. (11 to 40 inches thick)

Table 10.--Chemical and physical properties of 8 profiles of the Dickson Series

Horizon		K	Mg	Ca	Al	Cation
						Exchange Capacity
		Meq per 100g				
A1	average	1.03	.36	1.85	1.35	5.21
	range	.82-1.26	.19-.71	.45-5.22	.27-2.73	4.19-5.51
A2	average	1.12	.12	.24	2.11	4.14
	range	.83-1.59	.06-.20	.10-.40	1.24-2.94	2.83-4.97
B1	average	.12	.26	.31	3.30	4.42
	range	.09-.18	.10-.54	.12-.58	2.75-3.66	4.17-4.76
B2	average	.10	.38	.26	4.01	5.23
	range	.07-.13	.16-.67	.09-.60	2.91-4.89	4.71-5.96
B'X1	average	.08	.40	.20	4.39	5.75
	range	.06-.10	.18-.69	.10-.94	3.15-5.27	4.08-7.18
B'X2	average	.08	.41	.27	6.34	7.70
	range	.06-.15	.20-.64	.06-.87	5.61-7.72	6.49-8.99
IIB'2t	average	.08	.39	.14	7.10	8.20
	range	.06-.10	.20-.54	.06-.22	6.49-8.05	7.40-8.93

Horizon		Base	Organic	Total	Available	pH
		Saturation	Matter	N	P	
		Percent			ppm	
A1	average	64	4.7	.15	5.62	4.9
	range	36-94	3.9-6.1	.11-.21	4.9-7.7	4.5-5.1
A2	average	42	1.2	.05	.70	4.9
	range	33-56	.7-1.7	.04-.07	.35-1.05	4.7-5.2
B1	average	17	.6	.04	.57	5.0
	range	8-29	.4-.8	.04-.05	.35-.70	4.8-5.2
B2	average	15	.4	.03	approx. .26	5.1
	range	7-30	.3-.5	.03	<.14-.35	5.0-5.2
B'x1	average	13	.2	.01	approx. .20	5.2
	range	8-28	.1-.3	.01-.03	<.14-.35	5.0-5.3
B'x2	average	10	.2	- - -	approx. .18	5.3
	range	6-20	.1-.2	- - -	<.14-.35	5.2-5.4
IIB'2t	average	8	.2	- - -	<.14	5.4
	range	5-10	.1-.2	- - -	- - -	5.2-5.5

Horizon		Sand	Silt	Clay	Moisture Holding Capacity		Bulk Density
					1/3 Bar	15 Bar	
		Percent			Percent by Weight		g/cm ³
A1	average	15	68	17	- - -	9.2	
	range	10-20	62-74	14-20	- - -	6.4-13.4	- - -
A2	average	10	65	25	25.5	6.0	1.35
	range	2-20	60-70	20-28	22.4-29.2	4.7-6.9	1.25-1.44
B1	average	8	61	31	24.2	8.4	1.42
	range	2-14	52-66	26-34	22.9-27.1	7.8-9.4	1.28-1.54
B2	average	10	60	30	22.0	8.7	1.62
	range	6-18	56-64	26-32	20.0-22.8	7.8-9.5	1.55-1.70
B'x1	average	11	57	32	20.2	9.2	1.67
	range	4-20	50-62	22-42	17.9-22.1	5.8-12.4	1.60-1.71
B'x2	average	13	47	40	- - -	13.8	- - -
	range	6-22	42-54	32-52	- - -	11.0-18.4	- - -
IIB'2t	average	15	39	46	- - -	18.4	- - -
	range	10-24	36-40	36-52	- - -	15.8-20.8	- - -

MOUNTVIEW SERIES

Classification: Fine-silty, siliceous, thermic Typic Paleudults

Typical Profile:

- A1 -- 0-3" -- Grayish brown (10 YR 5/2) silt loam; weak fine granular structure; very friable; abundant fine; plentiful medium roots; 2 percent coarse fragments; strongly acid; clear wavy boundary. (2 to 4 inches thick)
- A2 -- 3-9" -- Yellowish brown (10 YR 5/4) silt loam; moderate fine and medium subangular blocky structure; very friable; abundant fine and medium roots; 2 percent coarse fragments; strongly acid; clear smooth boundary. (5 to 7 inches thick)
- B1 -- 9-18" -- Yellowish brown (10 YR 5/5) silt loam; moderate fine and medium subangular blocky structure; friable; plentiful fine and medium roots; thin discontinuous clay films on ped faces; 11 percent coarse fragments; strongly acid; clear smooth boundary. (6 to 10 inches thick)
- B21t -- 18-33" -- Yellowish brown (10 YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine and medium roots; thin discontinuous clay films on ped faces; 5 percent coarse fragments; strongly acid; gradual smooth boundary. (7 to 16 inches thick)
- IIB22t -- 33-43" -- Strong brown (7.5 YR 5/6) silty clay loam; common medium distinct pale brown (10 YR 6/3) and brownish yellow (10 YR 6/8) mottles; moderate medium angular blocky structure; firm; very few fine roots; thin discontinuous clay films on ped faces; 7 percent coarse fragments; strongly acid; gradual smooth boundary. (8 to 11 inches thick)
- IIB23t -- 43-61" -- Yellowish brown (10 YR 5/6) silty clay loam; many large distinct red (2.5 YR 4/6) mottles; moderate fine and medium subangular blocky structure; firm; 16 percent coarse fragments; strongly acid; gradual smooth boundary. (9 to 19 inches thick)
- IIB24t -- 61-76" -- Red (2.5 YR 4/6) clay; common large distinct yellowish brown (10 YR 5/6) mottles; strong fine and medium subangular blocky structure; very firm; strongly acid.

Table 11.--Chemical and physical properties of 2 profiles* of the Mountview Series

Horizon		Exchangeable				Cation
		K	Mg	Ca	Al	Exchange Capacity
----- Meq per 100g -----						
A1	average	1.02	.46	2.08	.82	5.00
A2	average	.89	.14	.30	1.90	3.80
B1	average	.14	.38	.24	3.34	4.62
B21t	average	.14	.44	.28	4.16	5.50
IIB22t	average	.13	.48	.24	4.54	6.02
IIB23t	average	.10	.36	.11	5.77	7.12

Horizon		Base	Organic	Total	Available	pH
		Saturation	Matter	N	P	
		----- Percent -----			ppm	
A1	average	73	5.3	.16	6.74	5.1
A2	average	39	1.4	.06	1.22	5.1
B1	average	18	.6	.04	.52	5.1
B21t	average	16	.3	.04	.52	5.2
IIB22t	average	15	.2	.02	.35	5.2
IIB23t	average	9	.1	.01	<.14	5.4

Horizon		Sand	Silt	Clay	Moisture Holding Capacity		Bulk
		Percent	Percent	Percent	1/3 Bar	15 Bar	Density
		----- Percent -----			Percent by Weight		g/cm ³
A1	average	16	65	18	---	11.3	---
A2	average	7	66	27	25.8	7.1	1.25
B1	average	8	58	34	22.4	9.1	1.42
B21t	average	7	58	35	23.3	9.8	1.60
IIB22t	average	7	54	39	23.2	12.2	1.59
IIB23t	average	8	48	44	25.3	15.4	1.56

*Range not meaningful

TAFT SERIES

Classification: Fine-silty, siliceous, thermic Glossaquic Fragiudults

Typical Profile:

- A1 -- 0-1" -- Dark grayish brown (10 YR 4/2) silt loam; weak medium granular structure; very friable; abundant fine roots; 1 percent coarse fragments; very strongly acid; abrupt wavy boundary. (1 to 3 inches thick)
- A2 -- 1-7" -- Pale brown (10 YR 6/3) silt loam; weak medium subangular blocky structure; friable; abundant fine, few medium, plentiful large roots; very strongly acid; clear smooth boundary. (5 to 7 inches thick)
- B1 -- 7-12" -- Reddish brown (2.5 YR 5/3) silt loam; moderate fine and medium subangular blocky structure; friable; plentiful fine, few medium roots; 1 percent coarse fragments; very strongly acid; clear smooth boundary. (5 to 9 inches thick)
- B2 -- 12-20" -- Yellowish brown (10 YR 5/5) silty clay loam; common medium distinct light olive brown (2.5 YR 5/4) and common medium faint light brownish gray (2.5 YR 6/2) mottles; moderate medium subangular blocky structure; friable; very few fine, medium and large roots; 2 percent coarse fragments; very strongly acid; gradual wavy boundary. (5 to 10 inches thick)
- B'x1 -- 20-28" -- Grayish brown (2.5 YR 5/2) silty clay loam; common medium distinct yellowish brown (10 YR 5/6) mottles; weak medium platy breaking to moderate medium angular blocky; firm; common thick light brownish gray (10 YR 6/2) clay films on ped faces, few clay columns between peds; 2 percent coarse fragments; strongly acid; gradual wavy boundary. (6 to 28 inches thick)
- B'x2 -- 28-37" -- Light olive brown (2.5 YR 5/3) silty clay loam; common medium distinct gray (10 YR 6/1) and yellowish brown (10 YR 5/6) mottles; weak medium platy breaking to moderate medium angular blocky structure; firm; common thick clay films on ped faces; clear irregular boundary. (8 to 16 inches thick)
- IIB'2t -- 37-62" -- Red (2.5 YR 5/8) to yellowish brown (10 YR 5/6) to gray (7.5 YR 5/0) to white (7.5 YR 8/0) clay; moderate medium subangular blocky structure; firm, abrupt broken boundary.

Table 12.--Chemical and physical properties of 6 profiles of the Taft Series

Horizon		Exchangeable				Cation
		K	Mg	Ca	Al	Exchange Capacity
----- Meq per 100g -----						
A1	average	1.07	.24	.78	2.21	5.34
	range	.94-1.21	.14-.34	.30-1.21	1.65-2.88	4.20-6.33
A2	average	1.02	.09	.17	2.65	4.46
	range	.78-1.21	.06-.13	.13-.22	1.71-3.60	3.45-5.83
B1	average	.07	.11	.14	3.27	4.05
	range	.05-.09	.06-.20	.10-.18	.24-3.81	3.09-4.76
B2	average	.07	.18	.13	3.74	4.55
	range	.04-.09	.09-.33	.07-.16	3.24-4.33	3.93-5.45
B'x1	average	.07	.22	.12	3.98	4.91
	range	.05-.08	.12-.42	.05-.25	3.35-5.00	4.17-6.43

Horizon		Base	Organic	Total	Available	pH
		Saturation	Matter	N	P	
----- Percent ----- ppm						
A1	average	48	5.0	.15	5.78	4.6
	range	37-55	3.8-6.4	.12-.18	4.20-8.40	4.4-4.9
A2	average	34	1.2	.05	.54	4.8
	range	29-44	1.0-1.4	.04-.06	.35-.88	4.8-4.9
B1	average	9	.5	.04	.58	5.0
	range	8-11	.4-.8	.03-.04	.35-.70	4.9-5.1
B2	average	10	.4	.03	.41	5.1
	range	6-12	.2-.6	.02-.04	.35-.70	5.0-5.2
B'x1	average	10	.2	.01	.41	5.2
	range	6-12	.1-.4	<.01-.03	.35-.70	5.1-5.2

Horizon		Sand	Silt	Clay	Moisture Holding Capacity		Bulk
		Percent	Percent	Percent	1/3 Bar	15 Bar	Density
----- Percent ----- Percent by Weight ----- g/cm ³							
A1	average	12	70	18	---	9.1	---
	range	4-20	62-76	16-24	---	6.8-12.0	---
A2	average	5	70	25	26.6	6.1	1.35
	range	0-14	62-74	18-34	24.1-28.0	4.2-8.2	1.30-1.39
B1	average	7	64	29	23.0	7.2	1.51
	range	0-16	60-74	24-34	22.2-23.8	5.6-8.3	1.45-1.57
B2	average	8	62	30	22.0	7.6	1.60
	range	4-20	58-66	22-36	19.9-23.6	6.6-9.0	1.53-1.71
B'x1	average	10	60	30	20.8	7.7	1.62
	range	6-20	56-66	28-36	18.8-24.3	6.7-9.2	1.51-1.72

WESTERN HIGHLAND RIM PHYSIOGRAPHIC SUBPROVINCE

BAXTER SERIES

Classification: Clayey, mixed, mesic Typic Paleudults

Typical Profile:

- A1 -- 0-3" -- Brown (10 YR 4/3) cherty silt loam; weak fine granular structure; very friable; abundant fine, few medium roots; 29 percent chert fragments; very strongly acid; abrupt wavy boundary. (2 to 3 inches thick)
- A2 -- 3-10" -- Yellowish brown (10 YR 5/6) cherty silt loam; moderate fine and medium subangular blocky structure; friable; abundant fine and medium roots; 17 percent chert fragments; very strongly acid; gradual smooth boundary. (6 to 7 inches thick)
- B1 -- 10-17" -- Yellowish brown (10 YR 5/4) cherty silty clay loam; moderate medium subangular blocky structure; friable; abundant fine, plentiful medium, few coarse roots; 18 percent chert fragments; very strongly acid; abrupt smooth boundary. (5 to 8 inches thick)
- B21t -- 17-26" -- Yellowish brown (10 YR 5/6) silty clay loam; few medium distinct red (2.5 YR 5/6) mottles; moderate fine and medium angular blocky structure; friable; plentiful fine and medium, few coarse roots; 14 percent chert fragments; strongly acid; abrupt irregular boundary. (6 to 12 inches thick)
- B22t -- 26-35" -- Brownish yellow (10 YR 6/6) cherty silty clay loam; common medium distinct red (2.5 YR 5/6) and few medium distinct very pale brown (10 YR 7/4) mottles; moderate fine and medium angular blocky structure; firm; few fine and medium roots; many thick clay films on ped faces; 19 percent chert fragments; strongly acid; clear wavy boundary. (8 to 10 inches thick)
- B23t -- 35-48" -- Red (2.5 YR 5/8) and yellowish brown (10 YR 5/6) very cherty clay; common medium distinct very pale brown (10 YR 7/4) mottles; moderate coarse and very coarse platy breaking to moderate fine and medium angular blocky structure; firm; about 85 percent coarse fragments; strongly acid; clear wavy boundary. (12 to 32 inches thick)
- B24t -- 48-61" -- Light gray (10 YR 7/1) to yellowish brown (10 YR 5/8) cherty clay; moderate coarse and very coarse platy structure; very firm; 70 to 85 percent coarse fragments; abrupt wavy boundary. (12 to 15 inches thick)

Table 13.--Chemical and physical properties of 2 profiles* of the Baxter Series

Horizon		Exchangeable				Cation Exchange Capacity
		K	Mg	Ca	Al	
		----- Meq per 100g -----				
A1	average	1.10	1.02	3.86	.51	6.78
A2	average	1.00	.34	.79	1.19	3.78
B1	average	.14	.71	.58	2.26	4.16
B21t	average	.15	1.16	.54	2.69	7.48
B22t	average	.17	1.31	.34	7.42	9.63
B23t	average	.13	.87	.21	7.88	9.96

Horizon		Base Saturation	Organic Matter	Total N	Available P	pH
A1	average	88	5.7	.18	8.00	5.4
A2	average	62	1.5	.07	1.49	5.2
B1	average	30	.6	.04	.87	5.1
B21t	average	25	.4	.04	.18	5.1
B22t	average	19	.3	.03	< .14	5.2
B23t	average	14	.2	.03	< .14	5.1

Horizon		Sand	Silt	Clay	Moisture Holding Capacity		Bulk Density
					1/3 Bar	15 Bar	
		----- Percent -----			Percent by Weight		g/cm ³
A1	average	11	72	17	---	8.4	---
A2	average	7	69	24	29.0	6.1	1.25
B1	average	11	54	35	22.5	9.7	1.50
B21t	average	10	43	47	26.5	15.0	1.50
B22t	average	11	35	55	26.3	18.4	1.51
B23t	average	4	39	57	---	7.9	---

*Range not meaningful

BODINE SERIES

Classification: Loamy-skeletal, siliceous, thermic Typic Paleudults

Typical Profile:

- A1 -- 0-2" -- Dark grayish brown (10 YR 4/2) cherty silt loam; moderate medium granular structure; very friable; abundant fine and medium roots; 30 percent chert fragments; neutral; clear wavy boundary. (1 to 5 inches thick)
- A2 -- 2-8" -- Brown (10 YR 5/3) cherty silt loam; moderate medium granular structure; very friable; plentiful fine and medium roots; 19 percent coarse fragments; strongly acid; clear wavy boundary. (3 to 8 inches thick)
- B1 -- 8-14" -- Yellowish brown (10 YR 5/4) cherty silt loam; moderate medium subangular blocky structure; very friable; plentiful fine and medium roots; thin patchy clay films on ped faces; 24 percent chert fragments; very strongly acid; clear wavy boundary. (0 to 8 inches thick)
- B2t -- 14-25" -- Strong brown (7.5 YR 5/6) and yellowish brown (10 YR 5/4) cherty silt loam; moderate medium and coarse subangular blocky structure; friable; plentiful fine and medium roots; moderately thick patchy clay films on ped faces; 38 percent chert fragments; strongly acid; clear smooth boundary. (5 to 16 inches thick)
- B3 -- 25-35" -- Light brown (7.5 YR 6/4) and strong brown (7.5 YR 5/6) cherty silt loam; moderate medium and coarse subangular and angular blocky structure; firm; few fine and medium roots; moderately thick patchy clay films on peds and gravel; 80 percent chert fragments.

Table 14.--Chemical and physical properties of 7 profiles of the Bodine Series

Horizon		Exchangeable				Cation
		K	Mg	Ca	Al	Exchange Capacity
----- Meq per 100g -----						
A1	average	.55	1.63	10.06	.08	12.52
	range	.38-.75	1.10-2.15	4.58-19.84	.04-.19	6.66-22.62
A2	average	.30	.53	2.09	.54	3.70
	range	.11-.50	.15-1.18	.44-5.93	.05-.96	2.22-7.17
B1	average	.14	.46	.84	1.59	3.22
	range	.10-.22	.09-1.11	.30-2.44	.09-2.79	2.17-4.97
B2t	average	.19	1.12	.67	1.75	4.22
	range	.12-.28	.09-2.05	.06-1.60	.42-3.88	2.30-7.05
B3	average	.16	.80	.65	1.31	3.34
	range	.08-.98	.30-1.33	.36-1.16	.10-1.77	2.06-4.88

Horizon		Base	Organic	Total	Available	pH
		Saturation	Matter	N	P	
		----- Percent -----			----- ppm -----	
A1	average	98	6.9	.25	6.45	6.4
	range	94-100	5.6-9.6	.20-.36	3.15-9.45	5.5-7.3
A2	average	72	2.1	.09	1.60	5.7
	range	34-98	1.2-3.7	.06-.14	1.40-3.85	5.0-7.0
B1	average	43	.7	.04	1.13	5.2
	range	22-97	.3-.9	.03-.06	.42-1.75	4.7-6.7
B2t	average	49	.3	.03	approx. .35	5.0
	range	22-82	.2-.4	.02-.04	<.14-.70	4.6-5.5
B3	average	50	.3	.02	approx. .29	4.8
	range	31-86	.1-.6	.02-.04	<.14-.70	4.6-5.0

Horizon		Moisture Holding Capacity			Bulk Density
		Sand	Silt	Clay	
		----- Percent -----			g/cm ³
A1	average	26	55	19	16.9
	range	16-34	46-64	16-22	13.3-21.3
A2	average	16	62	22	7.6
	range	6-24	52-74	20-24	6.2-8.9
B1	average	13	60	27	6.8
	range	4-20	54-70	24-32	4.2-9.4
B2t	average	20	51	29	8.9
	range	12-36	40-60	24-40	6.7-12.1
B3	average	35	42	23	7.3
	range	26-56	28-52	16-30	5.1-9.2

ENNIS SERIES

Classification: Fine-loamy, siliceous, mesic Fluventic Dystrochrepts

Typical Profile:

- A1 -- 0-2" -- Very dark grayish brown (10 YR 3/2) silt loam; weak fine granular structure; friable; abundant fine, plentiful medium roots; 3 percent coarse fragments; strongly acid; clear smooth boundary. (1 to 4 inches thick)
- A2 -- 2-10" -- Brown (10 YR 4/3) silt loam; weak fine granular and weak fine subangular blocky structure; friable; plentiful small, medium and large roots; 1 percent coarse fragments; strongly acid; clear smooth boundary. (6 to 12 inches thick)
- B21t -- 10-20" -- Yellowish brown (10 YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few fine and medium roots; thin discontinuous clay films; 2 percent coarse fragments; strongly acid; gradual wavy boundary. (9 to 16 inches thick)
- B22t -- 20-27" -- Strong brown (7.5 YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; thin discontinuous clay films; 5 percent coarse fragments; strongly acid; gradual wavy boundary. (6 to 11 inches thick)
- B23t -- 27-37" -- Pale brown (10 YR 6/3) silty clay loam; common medium distinct yellowish red (5 YR 5/6) mottles; moderate medium angular and subangular blocky structure; friable; moderately thick continuous clay films; 8 percent coarse fragments; strongly acid; gradual wavy boundary. (7 to 12 inches thick)
- B3 -- 37-44" -- Pale brown (10 YR 6/3) clay loam; common medium distinct yellowish brown (10 YR 5/6) and yellowish red (5 YR 5/6) mottles; moderate fine and medium angular blocky structure; firm; few medium roots, thin continuous clay films; 3 percent coarse fragments; strongly acid; gradual wavy boundary. (6 to 8 inches thick)

Table 15.--Chemical and physical properties of 1 profile of the Ennis Series

Horizon	Exchangeable				Cation
	K	Mg	Ca	Al	Exchange Capacity
----- Meq per 100g -----					
A1	.71	.65	2.51	1.08	5.30
A2	.63	.22	.40	1.52	3.11
B21t	.24	1.82	1.28	1.91	5.50
B22t	.29	3.10	1.76	3.09	8.34
B23t	.32	3.35	1.48	4.53	9.95
B3	.32	4.08	1.25	5.15	11.21

Horizon	Base	Organic	Total	Available	pH
	Saturation	Matter	N	P	
----- Percent -----					ppm
A1	74	6.0	.18	9.10	5.1
A2	42	1.2	.06	1.05	5.1
B21t	61	.4	.04	.70	5.4
B22t	62	.3	.04	<.14	5.4
B23t	52	.2	.04	<.14	5.2
B3	51	.2	.03	<.14	5.2

Horizon	Sand	Silt	Clay	Moisture Holding Capacity		Bulk
				1/3 Bar	15 Bar	Density
----- Percent -----				Percent by Weight		g/cm ³
A1	12	74	14	---	8.4	---
A2	12	68	20	28.2	5.2	1.20
B21t	8	62	30	24.4	8.8	1.46
B22t	12	54	34	25.6	12.7	1.50
B23t	14	50	36	28.4	13.3	1.48
B3	28	28	44	28.2	13.0	1.48

HUMPHREYS SERIES

Classification: Fine-loamy, siliceous, thermic Humic Hapludults*

Typical Profile:

- A1 -- 0-2" -- Very dark grayish brown (10 YR 3/2) cherty silt loam; moderate medium granular structure; very friable; abundant fine and medium roots; 18 percent chert fragments; neutral; clear wavy boundary. (1 to 4 inches thick)
- A2 -- 2-8" -- Brown (10 YR 4/3) silt loam; weak medium subangular blocky structure; very friable; abundant fine and medium roots; 15 percent coarse fragments; strongly acid; clear wavy boundary. (1 to 8 inches thick)
- B1 -- 8-16" -- Dark yellowish brown (10 YR 4/4) cherty silt loam; common medium distinct brown (10 YR 4/3) stains on ped faces; moderate medium subangular blocky structure; very friable; abundant fine and medium roots; few thin clay films on ped faces; 17 percent chert fragments; very strongly acid; clear wavy boundary. (6 to 12 inches thick)
- B21t -- 16-32" -- Brown (7.5 YR 4/4) cherty silt loam; common medium distinct dark brown (10 YR 3/3) stains on ped faces; moderate medium subangular blocky structure; friable; few fine roots; 21 percent chert fragments; very strongly acid; clear wavy boundary. (7 to 18 inches thick)
- B22t -- 32" -- Strong brown (7.5 YR 5/6) cherty silt loam; few fine faint pale brown (10 YR 6/3) mottles; common distinct brown (10 YR 4/3) stains on ped faces; moderate medium subangular blocky structure; friable; few fine roots; 43 percent chert fragments; very strongly acid.

* Six out of 8 profiles appear to be high base saturation taxadjuncts to the Humphreys Series.

Table 16.--Chemical and physical properties of 8 profiles of the Humphreys Series

Horizon		Exchangeable				Cation
		K	Mg	Ca	Al	Exchange Capacity
----- Meq per 100g -----						
A1	average	.59	1.88	9.96	.08	12.66
	range	.41-.82	1.65-2.60	3.5-12.75	.04-.16	5.99-19.72
A2	average	.31	.36	1.28	.74	2.95
	range	.15-.43	.13-.55	.44-1.85	.40-1.27	2.25-3.39
B1	average	.20	.79	.82	1.27	3.40
	range	.12-.46	.10-2.02	.25-1.98	.12-2.60	2.25-4.95
B21t	average	.28	1.21	.71	2.00	4.58
	range	.17-.45	.22-2.37	.40-1.24	.09-4.32	2.79-8.11
B22t	average	.17	1.01	.39	2.24	4.19
	range	.13-.23	.35-1.42	.19-.60	1.01-3.44	3.04-5.67

Horizon		Base	Organic	Total	Available	pH
		Saturation	Matter	N	P	
		----- Percent -----			----- ppm -----	
A1	average	98	7.5	.29	5.24	6.4
	range	97-99	5.9-10.0	.23-.40	4.20-8.75	6.3-6.9
A2	average	66	1.6	.08	1.65	5.4
	range	33-85	.7-2.4	.06-.10	.70-3.15	4.8-6.7
B1	average	53	.6	.04	.74	5.0
	range	20-89	.2-1.6	.03-.08	.35-1.05	4.7-5.8
B21t	average	50	.2	.03	approx. .30	5.0
	range	26-89	<.1-.4	.02-.04	<.14-.70	4.6-6.4
B22t	average	39	.18	.03	approx. .23	4.9
	range	25-55	<.1-.3	.03	<.14-.70	4.5-5.1

Horizon		Sand	Silt	Clay	Moisture Holding Capacity		Bulk
					1/3 Bar	15 Bar	Density
		----- Percent -----			----- Percent by Weight -----		g/cm ³
A1	average	21	61	18	---	18.2	---
	range	4-34	50-64	16-20	---	13.6-24.4	---
A2	average	13	64	23	28.1	7.4	1.23
	range	2-20	58-76	20-26	25.9-29.9	6.2-8.8	1.16-1.31
B1	average	13	60	27	26.2	7.8	1.25
	range	8-20	56-68	24-30	22.6-29.0	5.9-8.6	1.16-1.45
B21t	average	15	55	30	26.2	9.0	1.32
	range	6-22	50-60	24-38	25.2-29.8	7.0-11.9	1.18-1.42
B22t	average	19	54	27	---	8.3	---
	range	14-26	48-58	24-32	---	7.0-9.8	---

STEMLEY SERIES

Classification: Fine-loamy, siliceous, thermic Typic Fragiudults*

Typical Profile:

- A1 -- 0-3" -- Dark grayish brown (10 YR 4/2) silt loam; weak fine granular structure; very friable; abundant fine and medium roots; 7 percent coarse fragments; very strongly acid; clear wavy boundary. (2 to 5 inches thick)
- A2 -- 3-7" -- Yellowish brown (10 YR 5/4) cherty silt loam; weak medium granular and fine subangular blocky structure; very friable; abundant fine and medium, plentiful large roots; 21 percent coarse fragments; very strongly acid; clear wavy boundary. (4 to 9 inches thick)
- B1 -- 7-12" -- Yellowish brown (10 YR 5/5) cherty silt loam; weak fine subangular blocky structure; friable; plentiful fine, medium and large roots; 26 percent coarse fragments; very strongly acid; clear smooth boundary. (0 to 9 inches thick)
- B21t -- 12-19" -- Yellowish brown (10 YR 5/6) cherty silty clay loam; moderate fine and medium subangular blocky structure; friable; plentiful fine and medium roots; many thick clay films on ped faces; 16 percent coarse fragments; very strongly acid; clear wavy boundary. (0 to 11 inches thick)
- B22t -- 19-25" -- Strong brown (7.5 YR 5/6) cherty clay loam; common medium distinct yellowish brown (10 YR 5/8) and yellowish red (5 YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; thin patchy clay films on ped faces; about 30 percent coarse fragments; very strongly acid; abrupt wavy boundary. (0 to 25 inches thick)
- IIBx1 -- 25-38" -- Light yellowish brown (10 YR 6/4) to red (2.5 YR 4/6) silty clay loam; moderate coarse prismatic structure; firm; brown (7.5 YR 4/4) thin patchy clay films on ped faces; 5 percent coarse fragments; strongly acid; clear wavy boundary. (5 to 28 inches thick)
- IIB2t -- 38-48" -- Red (2.5 YR 4/8) to brownish yellow (10 YR 6/8) sandy clay loam; moderate coarse and very coarse platy structure; firm; abrupt wavy boundary. (0 to 45 inches thick)

* Six of 11 profiles are high base saturation taxadjuncts to the Stemley Series.

Table 17.--Chemical and physical properties of 11 profiles of the Stemley Series

Horizon		Exchangeable				Cation
		K	Mg	Ca	Al	Exchange Capacity
		Meq per 100g				
A1	average	.87	.69	3.24	.90	6.06
	range	.50-1.35	.20-1.51	.64-10.95	.05-1.77	3.82-13.43
A2	average	.75	.24	.60	1.29	3.39
	range	.11-1.42	.05-.50	.12-2.51	.21-2.06	2.55-3.71
B1	average	.19	.52	.43	2.33	3.85
	range	.03-.60	.04-.75	.10-.88	.77-3.26	1.81-5.18
B21t	average	.17	1.22	1.20	2.60	5.57
	range	.06-.28	.19-3.13	.13-3.47	.85-5.05	2.24-8.81
B22t	average	.22	2.39	1.98	2.90	7.83
	range	.09-.33	.51-4.02	.38-4.89	.68-6.00	3.26-11.80
IIBx1	average	.16	1.61	1.57	4.81	7.74
	range	.09-.26	.31-3.43	.14-3.52	1.34-7.62	3.94-10.33
IIB2t	average	.16	2.56	3.46	3.74	9.53
	range	.12-.19	2.04-3.08	2.90-4.03	3.66-3.84	8.02-11.04

Horizon		Base	Organic	Total	Available	pH
		Saturation	Matter	N	P	
		Percent			ppm	
A1	average	74	4.9	.17	6.19	5.3
	range	49-99	3.5-6.8	.12-.27	4.20-9.10	4.6-6.5
A2	average	50	1.3	.08	1.30	5.1
	range	18-92	.8-1.9	.04-.25	.70-3.85	4.9-5.6
B1	average	29	.9	.05	approx. .58	5.1
	range	10-68	.6-1.6	.04-.08	<.14-1.05	4.9-5.3
B21t	average	46	.5	.04	approx. .38	5.2
	range	9-84	.1-.8	.02-.06	<.14-.80	4.5-5.4
B22t	average	59	.4	.04	approx. .10	5.3
	range	21-84	.2-.5	.02-.05	<.14-.80	5.0-5.4
IIBx1	average	39	.3	.03	.18	5.3
	range	9-79	.1-1.4	<.01-.08	<.14-.70	5.0-5.4
IIB2t	average	66	.2	.03	<.14	5.3
	range	65-66	.2	.02-.03	- - -	5.2-5.3

Horizon		Sand	Silt	Clay	Moisture Holding Capacity		Bulk
		Percent			1/3 Bar	15 Bar	Density
		Percent			Percent by Weight		g/cm ³
A1	average	15	69	16	- - -	8.8	- - -
	range	8-22	62-76	14-18	- - -	6.5-17.8	- - -
A2	average	13	65	22	27.1	6.1	1.34
	range	4-28	54-76	18-24	21.7-30.7	4.4-8.4	1.20-1.43
B1	average	9	63	28	24.9	7.4	1.42
	range	4-12	58-72	24-32	21.6-30.7	4.5-9.4	1.19-1.52
B21t	average	12	56	32	24.5	9.9	1.45
	range	6-26	50-64	20-42	20.7-31.5	5.9-12.8	1.28-1.61
B22t	average	16	50	34	26.0	12.4	1.47
	range	8-24	46-56	26-38	21.3-29.0	8.3-17.6	1.38-1.64
IIBx1	average	18	44	38	25.6	12.6	1.54
	range	2-32	26-54	22-58	21.9-31.0	11.3-14.9	1.44-1.64
IIB2t	average	- - -	- - -	- - -	- - -	- - -	- - -
	range	- - -	- - -	- - -	- - -	- - -	- - -

Table 18.--Quantity per acre of various components in the upper 36 inches of the profile

Soil Series	Potential	Organic Matter	Total N	Available P	Exchangeable			
	: Available Moisture				: Matter	: N	: P	: K
	Inches	Pounds						
Cumberland Plateau:								
Clifty	9.5	268,000	11,700	17	1,600	280	870	3,200
Ealy	4.7	169,000	9,700	26	900	200	1,240	1,000
Gilpin	7.3	107,000	6,500	7	1,300	290	880	4,100
Hartsells	6.1	148,000	5,900	14	1,100	360	730	2,700
Linker	3.5	191,000	6,500	16	1,400	280	540	2,200
Lonewood	6.8	175,000	7,300	15	1,100	370	1,050	3,000
Lonewood, Red V.	6.4	232,000	6,200	14	1,500	670	880	4,000
Tilsit	5.8*	125,000	5,700	5	1,700	350	1,160	4,300
Eastern Highland Rim:								
Dewey	6.8	105,000	4,800	9	1,700	850	1,200	4,700
Dickson	5.2*	90,000	4,500	8	1,200	470	840	3,800
Mountview	7.8	116,000	6,200	14	1,600	560	1,010	3,600
Taft	5.3*	69,000	3,500	7	1,200	320	360	3,800
Western Highland Rim:								
Baxter	7.4	127,000	6,600	14	1,900	1,360	1,950	3,700
Bodine	7.1	124,000	6,100	12	1,000	1,230	3,480	1,400
Ennis	9.0	101,000	6,300	11	1,800	2,980	3,110	2,900
Humphreys	9.4	113,000	6,600	11	1,300	1,460	3,140	1,700
Stemley	5.5*	112,000	6,400	11	1,400	1,850	3,460	3,200

*Based on 24" to fragipan. It is assumed that roots do not penetrate the fragipan and that the water therein contained is not available.

Francis, J. K. and Nelson S. Loftus.

1977. Chemical and physical properties of Cumberland Plateau and Highland Rim forest soils. U.S. Dep. Agric. For. Serv. Res. Pap. SO-138, 44 p. South. For. Exp. Stn., New Orleans, La.

Soil descriptions and chemical and physical data for a number of soils of the Cumberland Plateau, eastern Highland Rim, and western Highland Rim areas of Tennessee are presented.

Additional keywords: soil profiles, soil series.

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
SOUTHERN FOREST EXPERIMENT STATION
T-10210 POSTAL SERVICE BUILDING, 701 LOYOLA AVE.
NEW ORLEANS, LOUISIANA 70113

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300

POSTAGE AND FEES PAID
U. S. DEPARTMENT OF
AGRICULTURE
AGR-101



AN EQUAL OPPORTUNITY EMPLOYER

THIRD CLASS