An Investigation of Soils Within the Tatum and Elioak Mapping Units in the Virginia Piedmont

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ABSTRACT

Morphological, chemical, physical, and mineralogical properties of soils within Tatum and Elioak mapping units from a portion of the Virginia Piedmont were examined. A random effects, nested design was used in which ten sites were examined in five counties for each soil. Within each site, three profiles were selected at random within 7m. Laboratory analyses included exchangeable cations, pH, whole soil Al, free Fe oxides, particle size, and sand, silt, and clay mineralogy. Analysis of variance was used to reveal the source of the variability.

Field examination shows that the soils within the Tatum and Elioak mapping units are very similar morphologically. Chemical analyses indicate that soils in the Elioak mapping units are more fertile than those of the Tatum, having a greater base saturation plus lower exchangeable and whole soil Al. The sand mineralogy is dominantly quartz for both Tatum and Elioak profiles. In the silt fraction, the average mica content of Elioak is much greater than Tatum. Mineralogical differences between Tatum and Elioak are insignificant in the clay fraction, with both soils having an average kaolinite content greater than 50%. Other clay minerals include, in descending order, hydroxy-interlayered vermiculite, vermiculite, mica, quartz, and gibbsite. Particle size analyses reveal that soils in the Elioak mapping units contain more sand than do soils in the Tatum mapping units. This difference is maximized in the C horizon.

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FOREWORD

This study was initiated in July 1980 with a soil sampling trip to describe profiles and collect samples. The samples were brought back for determination of laboratory properties. Upon completion of the characterization, a second field trip was held on March 22-24, 1982. Participants on the trip included the authors, several soil scientists of the Virginia Tech Soil Survey, Soil Conservation Service regional soil correlators from Richmond, Virginia, and other interested parties.

The purpose of the trip was to reexamine the sampled sites of the Tatum and Elioak mapping units with complete chemical, physical, and mineralogical data available. Discussion at each site included placement of the profile in a suitable series concept. The important points discussed are included with the profile description for that site and listed as "trip comments."

INTRODUCTION

Variability in soils is well documented (Drees and Wilding, 1973; Beckett and Webster, 1971; Hammond et al., 1958). It has long been established that soils vary due to the interaction of parent material, relief, climate, biological activity, and time, though each of these factors acts over a different spacial scale (Burrough, 1981). Wilding and Drees (1978) have grouped spacial variability into two types: systematic, that which can be related to some cause or landscape feature; and random, that which cannot be related to a known cause.

In mapping soils, systematic variability is partitioned and evaluated. Selected soil properties, whose distribution is usually related to landforms, parent material, or other soil features, are utilized to delineate soil mapping units. For the field mapper, important properties are soil color, texture, consistence, solum thickness, and depth to mottles.

Chemical and mineralogical properties measured in the laboratory are equally important, but it is difficult, except through extrapolation of data, to take these into account when a soil is mapped. Thus, field scientists designate "typifying profiles" based on their judgment as to the most common morphological features. From this profile, samples are evaluated in the laboratory.

In the survey process, soil variability causes complications. It is a fact that all variability cannot be delineated on a soil map, because of random variation in properties, the lack of detail in a second-order soil survey, and the lack of covariance between laboratory measured properties and soil morphological properties.

Mausbach et al. (1980) pointed out that the concept of the typifying pedon tends to examine the soil and mapping unit in a single dimension. It was suggested that the pedon selected for sampling and characterization be accompanied by "satellite" samples from important horizons surrounding the chosen pedon, in order to properly estimate the range of chemical and physical characteristics. In their study, variability of laboratory-measured properties existed even in morphologically-matched pedons.

Interest has recently focused on investigations of variability within single mapping units. Campbell (1978) studied sand content and pH variation in two mapping units in order to define the range of variation of these properties in soils formed in two parent materials. Elemental variability has been studied in detail by Drees and Wilding (1973) and Williams and Rayner (1977). Ransom et al. (1981) examined three mapping units in Arkansas for drainfield suitability and taxonomic composition. For the chosen units, composition of similar and dissimilar soils ranged from 50 to 100% purity.

While detailed characterization is especially useful in urban areas (Amos and Whiteside, 1975; Ransom et al.,1981), the desire to examine variation of soil properties in mapping units and their deviation from the central concept may be offset by the feasibility. Consideration of these factors for a second-order soil survey may prove to be laborious, costly, and time consuming. The accomplishment of mapping unit characterization needs to be a balance of the ease of sampling and characterization, with confidence that the actual range of properties has been established.

The Tatum and Elioak soil series in the Piedmont physiographic province of Virginia have been mapped on separate geologic units of metamorphic parent materials. This geologic division has provided a meaningful separation for mapping, yet both series are mapped on geologic formations composed of a variety of sedimentary and igneous metamorphosed materials. The composition contains an array of schists, gneisses, and phyllites.

The study of the areal geology is complicated by these unconformities, as well as the folding, faulting, shearing, and weathering these structures have undergone in their geomorphic history. Soil properties should reflect these parent material differences. Over a period time, these differences may become less apparent in properties of the solum. The concept of convergence of soil characteristics through weathering has been established for many years (Cobb, 1928). Rabenhorst and Foss (1981) point out that while distinctive differences in geology may exist below the solum, Soil Taxonomy concludes that "it is impractical to delineate their extent on maps." It should be noted, however, that on the series level, the underlying parent material may change the use and management of the soil, especially for urban purposes.

The intent of the study was to investigate the characteristics of the soils mapped as Tatum and Elioak. Due to similar heterogeneous parent mererial, similar morphological features, and the extensive weathering these soils have undergone, it was uncertain whether significant differences exist between these soils. By sampling soil profiles from areas mapped and correlated as Tatum and Elioak, it was anticipated that a more complete understanding could be gained as to the properties of these soils. The objectives of this study were to:

i. investigate the variance of soil properties of profiles selected from Tatum and Elioak mapping units to observe if the chosen properties differentiate between these units. By doing so, the range of characteristics and the variance between and among the sampled profiles of the Tatum and Elioak mapping units can be analyzed.

ii. to evaluate variance within 7m, the linear interval to be considered in representing "...variability in the other properties that are preserved in samples" (Soil Survey Staff, 1975, p.3). Answers to these questions will provide a better understanding of soils that compose the Tatum and Elioak mapping units, leading to more accurate interpretations for use.

STUDY AREA

The study area incorporates a large portion of the Piedmont physiographic province of central Virginia (Figure 1). The Piedmont has a mild, temperate climate. The mean monthly temperature and precipitation distributions of 3 locations -- Warrenton (Fauquier County), Orange Research Station (Orange County), and Charlottesville (Albemarle County) -- were selected to represent the temperature and rainfall variations in the study area (Figures 2 and 3). The mean annual temperatures for the three locations are 12.8, 13.3, and 13.8^{0}C. The average precipitation is 100.8, 104.4, and 115.2 cm/year, respectively. These temperatures and rainfalls are representative of a mesic temperature regime and a udic moisture regime. Sites within delineations of soil mapping units of the Tatum and Elioak soil series were selected for this study. The sampling scheme included ten sites for each soil in each of five counties.

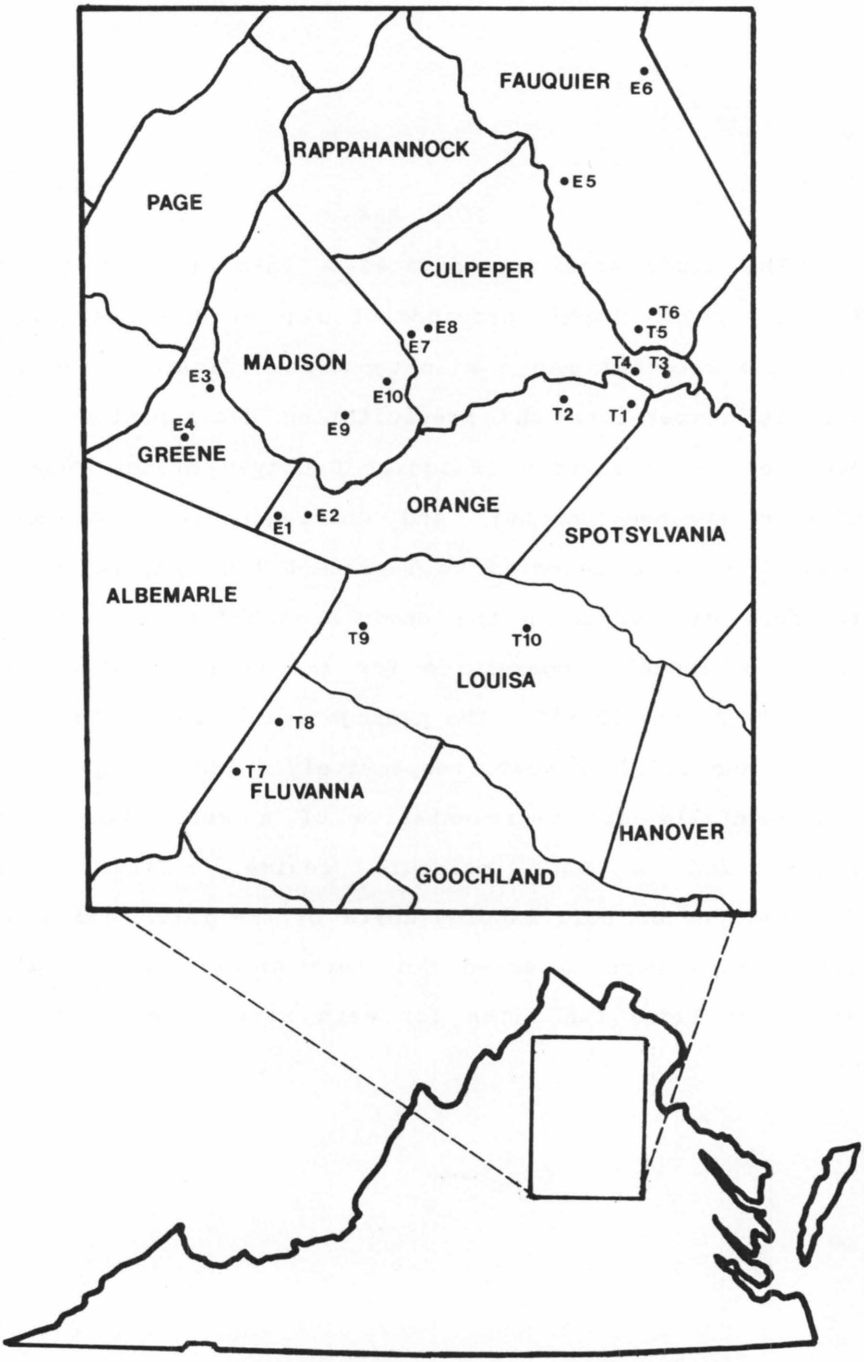

Figure 1. Sampling locations in the Piedmont of Virginia.

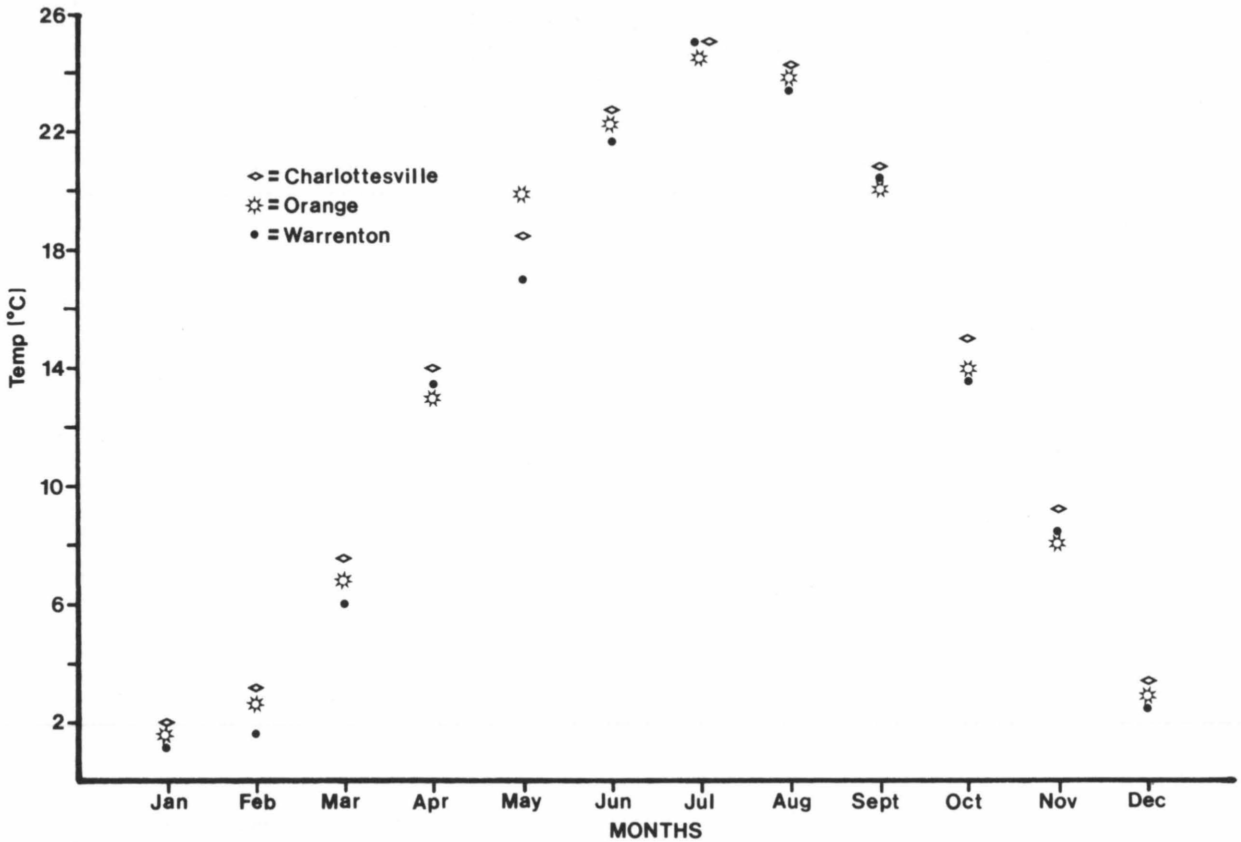

Figure 2. Mean monthly air temperatures for Charlottesville (Albemarle County), Orange Research Station (Orange County), and Warrenton (Fauquier County).

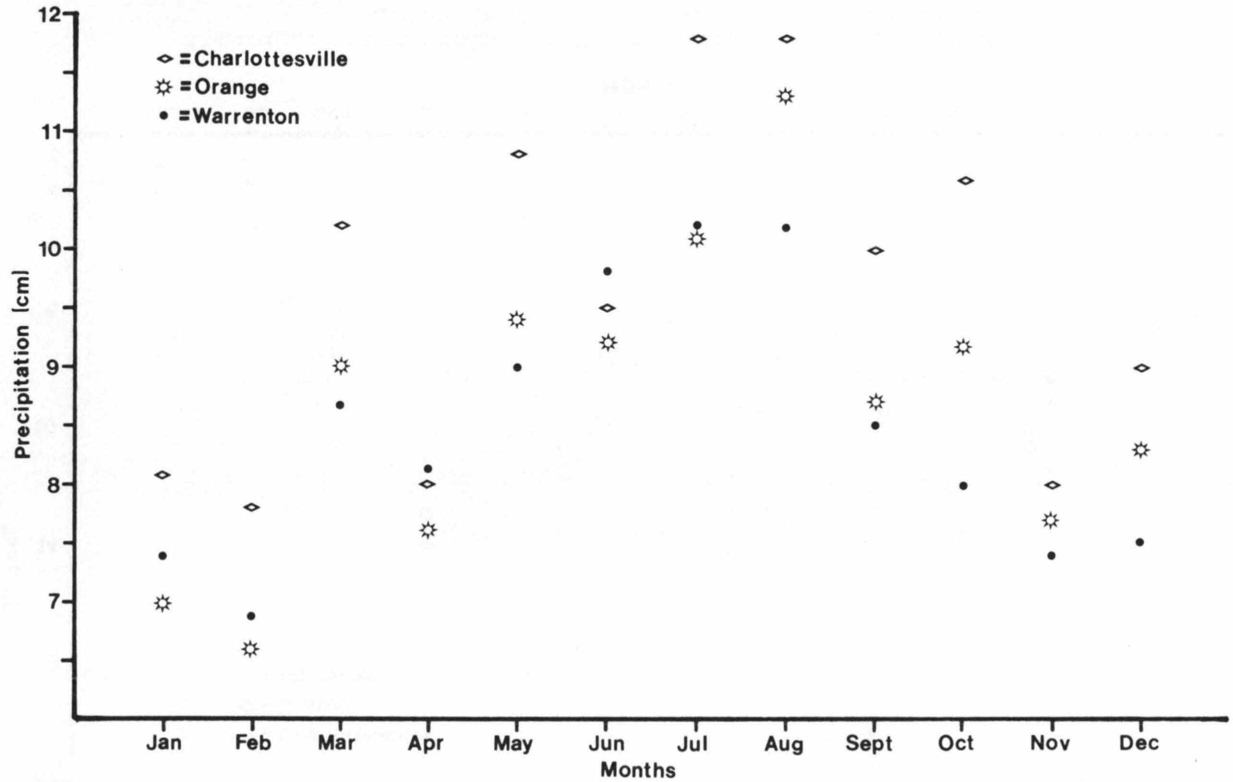

Figure 3. Mean monthly precipitation for Charlottesville (Albemarle County), Orange Research Station (Orange County), and Warrenton (Fauquier County).

REGIONAL GEOLOGY OF THE STUDY AREA

The Piedmont physiographic province is composed of Precambrian and lower Paleozoic igneous, metasedimentary, and metavolcanic eugeosynclinal rocks that are underlain by older Precambrian basement gneiss (Fisher, 1970; Conley, 1978). It is bounded on the west by the diametrically opposed miogeosynclinal deposits of the Ridge and Valley province and to the east by the relatively recent (Cretaceous and younger), partially consolidated marine deposits of the Coastal Plain (Dietrich, 1970).

The geology of the Piedmont has been affected by several metamorphic events and has undergone extensive deformation from folding and faulting (Hatcher, 1972; Conley, 1978). The formations were intruded by igneous, Triassic diabase dikes, and partially covered by upper Triassic sedimentary rocks (Hopkins, 1960). The Piedmont has also undergone several cycles of erosion and uplift since the Triassic (Cleaves, 1968; Parizek and Woodruff, 1956). These geologic and geomorphic events have caused a lack of distinct stratigraphic units and a scarcity of fossils (Fisher, 1970). Coupled with thick saprolite that limits the exposure of bedrock (Pavlides, 1980), the geology of the Piedmont is extremely difficult to map in terms of quantitative composition of formations and stratigraphy.

Much of the mapping has used bedrock exposed by rivers and streams and has been implemented through the use of aeromagnetics and aeroradioactivity (Neuschel, 1970; Reilly, 1980; Glover and Tucker,1979).

Metamorphism of the sedimentary and igneous rocks of the Piedmont has ultimately determined the mineralogical composition of the bedrock. Generally, metamorphism of sedimentary rocks has resulted in biotite gneiss and mica schist, while metavolcanic rocks are composed of amphibolitic minerals (Pavlides, 1980). The exact mineralogical species are determined by the degree of metamorphism, i.e. the pressure and temperature to which the rock is subjected. At low temperature metamorphism, muscovite is common in argillaceous or pelitic rocks, while low-temperature metamorphosed igneous rocks contain chlorite, actinolite, and epidote. At higher temperatures, muscovite alters to biotite, while the low temperature metavolcanic minerals are replaced by hornblende (Miyashiro, 1973).

Espenshade (1970) indicates that at least two periods of metamorphism are recorded in the Piedmont rocks: one of older Precambrian age and one during the middle Paleozoic period. The metamorphism that occurred varies across the Piedmont, but is thought to increase from west to east, with the age of the rock, and toward the boundaries of large intrusive masses (Hopkins, 1960). Bryant and Reed (1970) indicate that the Paleozoic metamorphism increases southeastward, in the opposite direction of the Precambrian metamorphism. The Paleozoic metamorphic events are thought to coincide with folding of the rock structure of the Piedmont and Ridge and Valley regions. The sedimentary rocks of the Triassic basins mark the "younger limit on the age of this deformation and metamorphism" (Fisher,1970).

The westward limit of metamorphism is the Blue Ridge anticlinorium, where the Precambrian basement complex has been thought to represent the "tectonic front" (Reed, 1970) or the isothermal boundary (Rodgers, 1964). Brown (1970) indicates that the Blue Ridge is actually the ancient ridge that separated the depositional subaqueous environments which created the opposing formations of the Piedmont and Ridge and Valley.

While the major structural elements of the Piedmont are known, the geologic relationships of the formations are still being investigated. Conley (1978) presents a good summary of the current knowledge of the region. The western portion or Inner Piedmont is more completely understood because the deformation is less intense. Further east, in the Outer Piedmont, stratigraphic relationships of formations are vague and less comprehensive. Examination of the Geologic Map of Virginia (Va. Div. Miner. Resour., 1963) shows that this region, as of that date, was only generally mapped, the formations being referred to as rocks of uncertain age. While much more has been learned in the past 20 years, the deformation has produced formations for which correlations are difficult and largely speculative.

The western portion of the Piedmont is composed of rocks which lie on the eastern limb of the Blue Ridge or Catoctin-Blue Ridge Anticlinorium (Bloomer and Werner, 1955; Brown, 1958; Espenshade, 1970). The anticlinorium is a broad unsymmetrical arch which separates the deposits of the Ridge and Valley province and the Piedmont.

The core of the anticlinorium is composed of the rocks of the Virginia Blue Ridge Complex, a mixture of Precambrian granites, gneisses, schists, and other metamorphosed rocks (Brown, 1958). These are the oldest exposed rocks in the state of Virginia, and have been radiometrically dated at 1,000 to 1,100 million years (Long et al., 1959). One formation of the complex is the Robertson River (Sample Site E7), a medium to coarse hornblende-oligoclase granite. Intruding into this formation are diabase dikes (Sample Site E8), generally thought to be of Triassic age (Hopkins, 1960).

Unconformably covering this basement complex is a sequence of metamorphosed late Precambrian and Paleozoic sediments derived from the basement complex. Generally, these formations become progressively younger, moving in an easterly direction across the Inner Piedmont. The sequence includes the Lynchburg (Sample Sites E1, E2, E9, and E10), a formation of conglomeratic gneiss, biotite gneiss, pebble quartzite, and phyllite (Bloomer and Werner, 1955). Allen (1963) identified the most prevalent rocks of the Lynchburg formation in Greene and Madison counties to be the biotite-muscovite schist and the biotite-muscovite-chlorite quartz gneiss. Examination of the rock type in the present investigation revealed phyllites and mica schists at the Orange County sites (Sample Sites E1 and E2), and metagreywackes at the Madison County sites (Sample Sites E9 and E10).

This sequence continues with the Swift Run Formation, a deposit of metamorphosed greywackes, subgreywackes, and volcanic rocks (Bloomer and Werner, 1955), and the Mechums River (Sample Sites E3 and E4), a formation described by Gooch (1958) as having metamorphosed conglomerates and siltstones intruded by metagabbro and diabase. The Mechums River Formation lies near the axis of the Blue Ridge Anticlinorium, with the Swift Run lying to the west and the Lynchburg Formation to the east. Gooch (1958) believed that the three formations could be correlated and were time equivalents.

Overlying these deposits is the Catoctin Formation, a metavolcanic greenstone interbedded with greywackes, tuffs, and arkoses (Bloomer and Werner, 1955), formed by basalt flows with a small amount of interlayered sedimentary rocks (Conley and Johnson, 1975). Chlorite and epidote also contribute to the composition of the rocks, creating the green shade for which the rock is named (Nelson, 1962).

The Catoctin formation establishes the boundary between the Blue Ridge anticline and the James River synclinorium (Brown, 1953; Hopkins, 1960), two complementary geologic structures. The Catoctin formation marks the western boundary of the syncline, while the Lynchburg formation again surfaces, forming the eastern boundary (Hopkins, 1960). Further east, folding has produced a continuance of this sequence of anticlines and synclines.

In Fluvanna County, the late Precambrian or Cambrian Catoctin formation is overlain by the Evingston group (Sample Sites T7 and T8), whose metasedimentary and metavolcanic units are subdivided on the basis of their phyllosilicate content (Smith et al.,1964). The two sample sites are located in the lower chlorite-muscovite unit, composed of phyllite and metamorphosed greywackes.

Sample Site T9 in western Louisa County is in the area mapped by Conley and Johnson (1975) as the Chandler Formation, a predominantly phyllitic rock, with some quartzite, marble, and volcanics. This formation overlies the Catoctin, and underlies the Chopawamsic, a formation also correlated in northern Virginia (Pavlides et al., 1974; Southwick et al.,1971).

The Chopawamsic outcrops in Louisa County in the area of Mineral (Sample Site T10). The rock is a sequence of metasedimentary and metavolcanic rocks, predominantly consisting of pyritic sericite quartzites, alternating with a sequence of metagreywackes, biotite-muscovite schists and amphibolites (Miller, 1978). Pavlides et al. (1974) found evidence that the Chopawamsic is coeval, or time equivalent, to the Evingston formation found in Fluvanna County.

The Wissahickon Formation (Sample Sites T1, T2, T3, T4, T5, and T6) lies below and interfingers with the Chopawamsic formation (Southwick et al.,1971), and is believed to be of late Precambrian (Southwick and Fisher, 1967) or Early Cambrian age (Seiders et al., 1975). The Wissahickon consists of fine to medium-grained nonlayered micaeous quartzofeldspathic gneiss and mica schist (Seiders et al.,1975). Neuschel (1970), using geophysical data, mapped the Wissahickon in the Spotsylvania County area. His mapping placed sample Sites T1 and T2 in the rock unit of quartz-muscovite schist.

Pavlides (personal communication), who is currently mapping the area, places Site T1 within a zone of fine-grained muscovite schist and phyllite. He indicates that fine-grained quartz or quartz veins may be locally present. Site T2 was in an area of "fine-grained generally polydeformed (more than one foliation and locally highly folded on a small scale) quartz muscovite schist." The schist is locally plutonic and cut by quartz grains.

Weir (1977) indicates that Site T3 is located in an area of medium to coarse-grained metamorphosed granite, containing quartz, orthoclase and plagioclase feldspars, biotite, chlorite, and epidote.

Finely laminated micaceous quartzite is the parent material of Sites T4, T5, and T6 (Weir, 1977). This rock is dominantly composed of quartz, feldspar, chlorite, biotite, muscovite, and epidote. It is characterized by thin quartz stringers and "extensive retrogression and abundant small scale folds."

MATERIALS AND METHODS

Sampling Technique

The sampling scheme was a random-effects, nested design and included ten sites within soil mapping units of Tatum and ten sites within soil mapping units of Elioak. These sites were selected from delineation on published soil survey maps (Coleman et al., 1941; Petro et al., 1944; Porter et al., 1947; Carter et al., 1971; Elder et al., 1975; Carter et al., 1976; Thomas and Crawford, in press), and includes surveys of both pre- and post-taxonomy. The study area was initially divided into strata (counties) to investigate possible differences. The data, however, revealed no differences between counties.

The delineations of soil mapping units sampled in this study occur on ridgetops with slopes of 2-8%. At each site, three random samples were taken within 7m. The 30 observations for each soil were described and sampled by taxonomic control section (Soil Survey Staff, 1975).

The Tatum series is presently classified as a clayey, mixed, thermic, Typic Hapludult; and the Elioak, a clayey, kaolinitic, mesic, Typic Hapludult. Both are deep, well drained soils occurring on nearly level to moderately steep slopes. The official series description (Soil Survey

Staff, 1976a; 1976b) reveals that both have brown silt loam surfaces and acidic, red, clayey subsoils. The Elioak is said to have formed in residuum weathered from mica schists, phyllites, and to some extent, gneiss, while the Tatum is formed in residuum of sericite schist or phyllite.

Laboratory Analyses

Chemical analyses included pH by equilibration in water (1:1 soil/solution) and exchangeable bases by NH_4OAc extraction (U.S.Dep. Agric., Soil Conserv. Serv., 1972). Analysis of Ca, Mg, and K was by atomic adsorption. Exchangeable Al was determined by equilibration of 5g soil with 50ml KCl followed by titration to a phenolphthalein endpoint. Whole soil Al was determined by equilibration of 2g soil with 50ml KCl and analyzed by the use of a Radiometer automated titration system. Exchangeable H was determined by $BaCl_2$-TEA. Percent base saturation was calculated by the sum of bases divided by the sum of bases plus $BaCl_2$-TEA acidity, times 100. Analyses of exchangeable bases, pH, and exchangeable Al were on the chemical control section and the A, B, and C horizons. The chemical control section was used for the whole soil Al. Analyses of the mineralogical control section included free Fe oxides by the dithionite-citrate-bicarbonate (DCB) procedure (Mehra and Jackson, 1960), and particle size analysis by the pipette method (Day, 1965), with sieving used to determine the sand fraction.

Mineralogical analysis involved pretreatments to remove organic matter with H_2O_2 and Fe oxides by DCB. After separation of the sand fraction by sieving, silt and clay were separated by centrifugation and decantation. Determination of clay mineralogy was by x-ray diffraction analysis (XRD), using K-saturated samples at 25, 110, 300, and 550°C. A separate clay aliquot was Mg-saturated, glycerol-solvated, and x-rayed at 25 and 110°C. A Diano XRD-8300AD diffractometer, equipped with a graphite crystal monochrometer and a LSI-11 computer, was used. The scanning rate was 2° 2θ per minute with CuKα radiation. Mineral estimation was by relative peak intensity, proportioning integrated peak areas of the diffractograms, using kaolinite as an internal standard, and assuming the minerals detected equal 100%.

Quantitative analyses of kaolinite and gibbsite in the clay fraction were estimated on a Dupont 1090 Differential Scanning Calorimeter using K-saturated samples. The clay was heated in a N_2 atmosphere from 50-625°C at a heating rate of 20°C/min. The amount of kaolinite and gibbsite was estimated by integrating the area under their respective endothermic peaks (approx. 280 and 520°C) and comparing them with standard kaolinite (poorly crystalline Georgia kaolinite from the University of Missouri minerals repository) and gibbsite (Reynolds synthetic gibbsite RH-31F).

Silt mineralogy was estimated by XRD using integrated peak intensity for Na-saturated powder mounts. Sand mineralogy was determined on a Zeiss polarizing light microscope using grain mounts prepared with Canada balsam. The <40-mesh fraction was used, which was dominant and assumed to represent the total sand fraction. The line count method (Galehouse, 1971) was employed, with grain counts normalized to frequency per 100 grains.

Statistical Analyses

Each observation (Y_{ijk}) in the study can be explained by the linear model:

$$Y_{ijk} = \mu + A_i + B_{ij} + \varepsilon_{ijk} \tag{1}$$

where μ represents an overall mean (base amount)

A_i represents an effect due to a particular soil

B_{ij} represents an effect due to a particular site

ε_{ijk} represents residual variation which includes natural variability and all other unexplained variation.

Each component was assumed to be normally and independently distributed with zero means and variances of σ^2_A, σ^2_B, and σ^2_ε, respectively (Edmonds et al., 1982).

Normal distributions were also assumed, with the mean value equal to μ and variance equal to

$$\sigma^2_Y = (\sigma^2_\varepsilon + R\,\sigma^2_B + RS\,\sigma^2_A)/SR \tag{2}$$

where there are S sites per soil and R profiles per site. The quantity in brackets in equation 2 is the expected mean square for soils, so an estimate of the required variance can be obtained from MS_A in the analysis of variance tables.

The confidence interval for the mean can be obtained using the t-distribution with (C-1) degrees of freedom, where C equals the number of soils and is calculated by

$$\bar{Y} \pm t_{0.05}(MS_B/N)^{1/2} \qquad (3)$$

where $t_{0.05}$ = the upper 5% point of a t variable with (C-1) degrees of freedom

MS_B = the mean square of sites

n = the total number of samples

Analysis of variance was used to determine the distribution of variance contributed by different sources (soil, site, and error) to the total variance, σ_t^2, which is defined as:

$$\sigma_t^2 = \sigma_A^2 + \sigma_B^2 + \sigma_\varepsilon^2 \qquad (4)$$

where σ_A^2 σ_B^2 and σ_ε^2 are the variances due to soil, site, and error components, respectively.

The variance contributed by soil, σ_A^2, is estimated by:

$$\sigma_A^2 = \frac{MS_A - MS_B}{SR} \qquad (5)$$

where MS_A is the mean square for soils and MS_B is the mean square for sites. The variance contributed by sites, σ_B^2 is estimated by:

$$\sigma_B^2 = \frac{MS_B - MS_\varepsilon}{R} \qquad (6)$$

where MS_{ε} is the mean square for errors. The error variance, σ^2_{ε}, composed of the natural soil variability within each site, and other unexplained variability, is estimated by MS_{ε}.

The percent of the total variance contributed by each component is calculated by dividing the variance for each component by the total variance, σ^2_t, and multiplying by 100 (Sokal and Rohlf, 1969).

The F-ratio for each source was calculated using Statistical Analysis System (SAS Institute, 1979) procedures. Statistical tables are used to provide the probability (PR>F) at which the variables or observations are statistically different for separation.

RESULTS AND DISCUSSION

Field Observations

The profile descriptions reveal that the sampled profiles from the Tatum and Elioak mapping units generally have a light yellowish brown (10YR 6/4) silt loam or loam surface and a red (2.5YR 4/6) clayey subsurface (see Appendix). Beneath the solum, these soils are underlain by a thick mantle of saprolite, resulting from the interaction of climate, biological activity, relief, dissolved ion contribution of the geologic material, and the thermodynamic susceptibility of the parent rock (Calvert et al., 1980a). Millot (1970) terms this feature arenization, in which the crystalline rock is still recognizable by its structure, quartz veins, and fracture traces, yet is decomposed or "rotten."

Profile differences for the A and B horizon colors are quite small. The red color is indicative of the high Fe content of the primary, weatherable minerals, such as biotite. These have been weathered, causing oxidation and release of the Fe, which is eluviated as an organic complex, or as a colloidal oxide (Pavich and Newell, 1981).

The Tatum profiles have a greater mean solum thickness than do the Elioak (Tables 1 and 2). This difference, also

Table 1. Data summary of free Fe oxides in the mineralogical control section, the A horizon thickness, and solum depth for profiles in the Tatum mapping units.

Variable	Mean	Δ*	Min.	Max.
Free Fe (%Fe_2O_3)	16.03	1.16	11.10	21.30
A Hor thick.(cm)	24.5	3.2	10	38
Solum depth (cm)	123.9	18.7	60	180

*The 90% confidence interval is given by "mean ± Δ."

reflected in the A horizon thickness, reveals the relative proportion of soil formation versus the conconmitant erosional processes. The solum thickness variation appears to be related to elevation. The Elioak sites, being generally further west and closer to the Blue Ridge, have higher elevations (536 ft ave.) than do the Tatum (407 ft ave.). This increase in elevation may reflect greater downwasting and erosion relative to weathering and soil formation on the saprolite and bedrock.

The field trip held in conjunction with this study emphasized the existence of old alluvial or colluvial deposits on the Piedmont land surface. These overlays were identified primarily on the Tatum mapping units. Less erosion seems to have taken place on the Tatum landscape, resulting in thicker profile development and preservation of these deposits on the land surface. John Elder (personal communication), soil scientist with the Virginia Tech soil survey, indicates that the shape of the landscape is important. He points out that Tatum soils, which more commonly have overlays, occur on broad, nearly level to gently sloping interfluves, and the Elioak soils occur on

Table 2. Data summary of free Fe oxides in the mineralogical control section, the A horizon thickness, and solum depth for profiles in the Elioak mapping units.

Variable	Mean	Δ*	Min.	Max.
Free Fe (%Fe_2O_3)	13.27	1.56	5.40	18.30
A Hor thick.(cm)	21.2	3.8	9	33
Solum depth (cm)	109.7	18.5	49	170

*The 90% confidence interval is given by "mean ± Δ."

landscapes that have relatively narrow ridge crests. However, it should be noted that, while all members of the field trip could agree that a capping existed at Site T10, the existence of overlays at other locations was difficult to observe, and not unanimously supported.

The cappings are believed to have originated when the Piedmont underwent cycles of erosion and uplift (Dietrick, 1970; Cleaves, 1968). This may also be due to an upward fining of particles during deposition. Cleaves and Costa (1979) speculate that the erosion may have been due to tectonism, climatic change, or eustatic fluctuations. The major portion of the erosive deposits now constitute the Coastal Plain region. Studying the Coastal Plain stratigraphy, researchers have been able to examine the weathering trends and to geologically date periods of Piedmont erosion (Cleaves and Costa, 1979).

Alluvial deposits have been left on the Piedmont uplands from this process, identifiable by the presence of diffuse stone lines (Parizek and Woodruff, 1956; Cleaves, 1968; Elder and Pettry, 1969b; Allen, 1963). The formation of these stone lines is thought to be a two-stage process:

initial concentration of the stones by winnowing of finer minerals from sheet erosion, wind, or extreme frost action; followed by a climatic change which produced erosional conditions causing deposition over the stone-covered surface (Parizek and Woodruff, 1956; Cleaves and Costa, 1979). Cleaves and Costa (1979) thought these changes may be tied to glacial advances.

Workers believe that the Piedmont has reached a somewhat stable form of relief, and is now a relatively flat, erosional surface or pediment (Dietrick, 1970). Allen (1963) indicates that the presence of gravel supports this concept and speculates that the Blue Ridge is actually a scarp formed by erosion in which the drainage divide is in constant westward migration. At this present geological time, Piedmont erosion is primarily in the form of fluvial incision by the rivers and streams. Therefore, it is the interfluves that remain covered by the alluvial deposits (Cleaves and Costa, 1979).

It was found in the present study that, in certain locations, the presence of an overlay was somewhat speculative. Recognition of overlays is complicated by similar particle size distribution of soils from both depositional or residual origin (Elder and Pettry, 1969a). Mixing or reworking of the gravel and overlay into the saprolite at the zone of contact has made the boundary diffuse and obscure (Cleaves, 1968).

During the field trip that accompanied this investigation, cappings were identified by John Elder at thicknesses ranging from several inches up to greater than six feet. Site E4 in Greene County was thought possibly to have a thin overlay, while site T10 in Louisa County had an overlay of greater than six feet.

Field identification of the capping was by landscape position, solum thickness, consistence of the soil, and the presence of subrounded and rounded quartzite clasts. Elder and Pettry (1969b) report that rock fragments are found in a form ranging from a regular stone line to a diffuse pattern throughout the solum. They also indicate that subhorizons of soils developed in the alluvial deposits are firm, very sticky, and plastic, while those from residuum are friable, non-plastic, and non-sticky. The differences in these properties are important in soil characteristics such as permeability and drainage.

The use of solum thickness for identification of areas where these deposits remain is questionable since Piedmont rock undergoes isovolumetric weathering (Cleaves, 1968). There is a loss of ions through leaching, yet the original volume of the rock is maintained. The bulk density decreases and the porosity increases. Weathering, therefore, does not result in the lowering of the land surface (Cleaves and Costa, 1979). In the interfluvial areas, where the land surface is most nearly level, infiltration will be the greatest, resulting in increased weathering, and a thicker cover of soil and saprolite.

Elder and Pettry (unpublished data) have shown a mineralogical discontinuity between overlays and residual saprolite. They found an inverse relationship of mica and quartz in the sand fraction of soil profiles examined in Spotsylvania County. The mica content of the overlay was low, while the quartz content was high. The opposite was found in the residual soil material, with an equal quantity of both minerals at the contact zone. In addition, there was an increased gibbsite content in the clay fraction of the overlay material.

The Brockroad and Catharpin soil series were established as a result of Elder and Pettry's study (Soil Survey Staff, 1980a; 1980b). These series cover the soils formed in interfluvial areas in western Spotsylvania County. The differences in productivity between the Brockroad and Catharpin and residual soils such as Nason and Tatum made these series necessary. Greater productivity can be achieved with the addition of lime and fertilizer on the Brockroad and Catharpin soils than on the residual soils of the area.

Further studies are needed of soils developed from these old depositions. Quantitative differences of physical and chemical properties between the Brockroad and Catharpin and residual soils need to be measured. Their general extent and range in the Piedmont must be examined in order to better classify these lands for use and management. As shown in this study, it is unlikely that these deposits occupy the entire Piedmont land surface in Virginia. Without experience, field identification is difficult by auger borings, yet in order to map these soils consistently, field criteria need to be established. Pit examinations, accompanied by laboratory analyses, are presently the best means for positive recognition.

Chemical Properties

Chemical analyses show the soil profiles of mapping units of both Tatum and Elioak to be generally acidic and low in bases (Tables 3 and 4). This acidity is due to either a deficiency of bases in the parent material or a result of weathering: a loss of bases such as Ca, Mg, and

Table 3. Data summary of the chemical parameters of the profiles in the Tatum mapping units by horizon and chemical control section.§

Variable	Horizon	Mean	Δ*	Min.	Max.
pH	A	4.61	0.37	3.81	6.24
	B	4.81	0.12	4.24	5.33
	C	4.81	0.13	4.31	5.81
	C.S.	5.12	0.30	3.80	5.80
Ca	A	1.18	1.02	0.03	6.48
	B	0.28	0.14	0.04	1.54
	C	0.08	0.02	0.03	0.22
	C.S.	0.11	0.02	0.07	0.30
Mg	A	0.22	0.11	0.04	0.66
	B	0.83	0.14	0.29	1.52
	C	0.26	0.10	0.08	0.83
	C.S.	0.23	0.06	0.04	0.46
K	A	0.17	0.04	0.04	0.36
	B	0.24	0.06	0.09	0.47
	C	0.06	0.02	0.01	0.20
	C.S.	0.11	0.02	0.05	0.23
%B.S.	A	13.97	10.17	1.87	73.11
	B	8.24	1.18	3.45	15.87
	C	3.36	0.62	1.86	6.64
	C.S.	4.10	0.84	2.03	10.55

§B.S. = base saturation, units of Ca, Mg, and K are meq/100g, C.S. = control section.
*90% confidence interval is given by "mean ± Δ."

Table 4. Data summary of the chemical parameters of the profiles in the Elioak mapping units by horizon and chemical control section.§

Variable	Horizon	Mean	Δ*	Min.	Max.
pH	A	5.01	0.49	3.89	6.63
	B	4.99	0.16	4.23	5.93
	C	4.97	0.10	4.57	5.31
	C.S.	5.19	0.16	4.30	5.70
Ca	A	1.49	1.02	0.06	5.81
	B	0.62	0.44	0.04	2.84
	C	0.19	0.07	0.03	0.96
	C.S.	0.18	0.06	0.04	0.94
Mg	A	0.42	0.25	0.07	1.51
	B	0.81	0.17	0.17	1.41
	C	0.41	0.14	0.06	1.53
	C.S.	0.34	0.13	0.03	1.32
K	A	0.21	0.05	0.07	0.46
	B	0.22	0.04	0.09	0.42
	C	0.15	0.05	0.02	0.32
	C.S.	0.13	0.03	0.03	0.26
%B.S.	A	20.34	11.96	2.22	59.23
	B	13.63	4.59	2.97	31.39
	C	8.70	2.45	3.20	31.82
	C.S.	6.99	1.86	1.28	20.79

§B.S. = base saturation, units of Ca, Mg, and K are meq/100g, C.S. = control section.
*90% confidence interval is given by "mean ± Δ."

Na, and a release of Si, Fe, and Al. The latter three elements are less mobile than the basic cations and reprecipitate as 1:1 or 2:1 clay minerals or sesquioxides, depending on solution composition (Jackson et al.,1948; Pedro et al.,1978).

Analysis of the exchangeable cations shows that maximum Ca occurred in the A horizon, while maximum Mg was in the B horizon. This result agrees with the findings of Rich and Obenshain (1955), Pleysier and Juo (1981), and Messick (1982). While Messick (1982) attributes this trend to the greater retention of Ca due to its smaller hydrated radii, it may also be due to greater nutrient cycling of Ca.

The profiles sampled in Elioak mapping units are more fertile than those of the Tatum. They have a slightly higher pH and base saturation, with lower exchangeable Al and H (Figure 4, Tables 5 and 6). An examination of

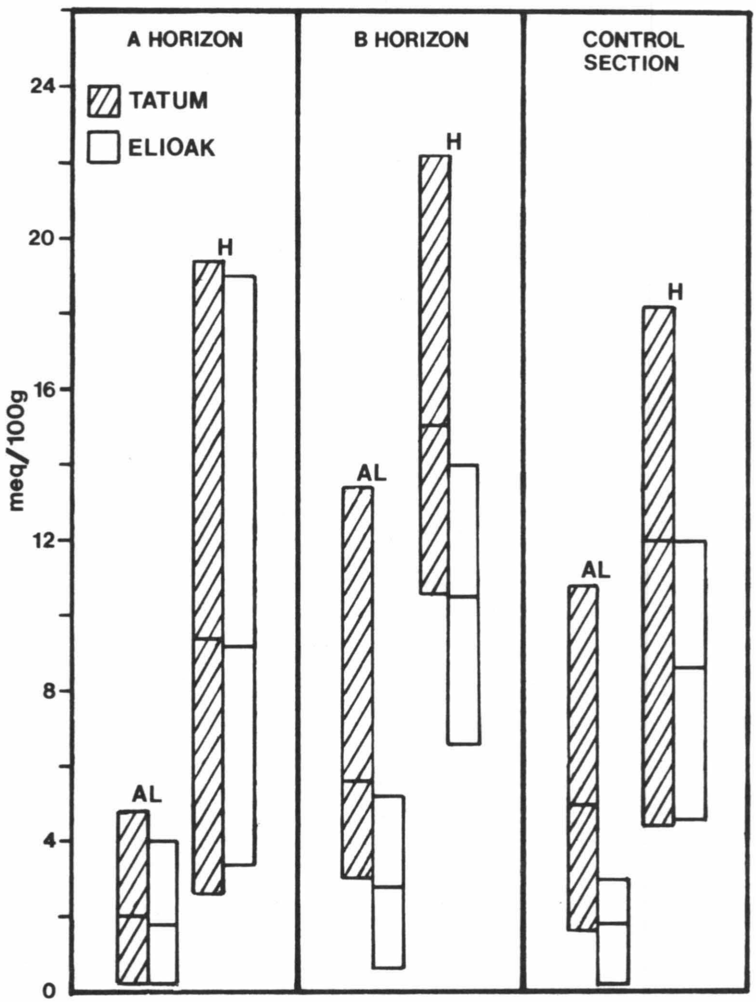

Figure 4. Mean and range of exchangeable Al (KCl) and exchangeable H ($BaCl_2$-TEA) for the A and B horizons and control section for the profiles of the Tatum and Elioak mapping units.

Table 5. Data summary of the exchangeable Al and H by horizon and chemical control section and whole soil Al in the mineralogical control section for the profiles in the Tatum mapping units.§

Variable	Horizon	Mean	Δ*	Min.	Max.
		------------meq/100g------------			
Al	A	2.00	0.74	0.05	4.75
	B	5.60	1.12	2.85	13.45
	C	5.51	1.55	2.75	14.45
	C.S.	4.98	2.90	1.65	10.75
H	A	9.47	2.39	2.60	19.40
	B	15.11	1.25	10.60	22.20
	C	11.24	1.74	5.60	20.40
	C.S.	11.97	1.53	4.40	18.20
WS. Al	C.S.	10.01	1.26	3.75	15.95

§C.S. = control section and WS = whole soil.
*90% confidence interval is given by "mean ± Δ."

Table 6. Data summary of the exchangeable Al and H by horizon and chemical control section and whole soil Al in the mineralogical control section for the profiles in the Elioak mapping units.§

Variable	Horizon	Mean	Δ*	Min.	Max.
		------------meq/100g------------			
Al	A	1.71	0.85	0.05	4.05
	B	2.72	0.75	0.45	5.15
	C	2.09	0.41	0.75	4.45
	C.S.	1.84	0.47	0.09	3.05
H	A	9.20	2.18	3.40	19.00
	B	10.53	1.12	6.60	14.00
	C	7.75	1.03	4.20	11.80
	C.S.	8.65	1.08	4.60	12.00
WS. Al	C.S.	4.07	0.74	2.06	7.43

§C.S. = control section and WS = whole soil.
*90% confidence interval is given by "mean ± Δ."

exchangeable Al on a percent clay basis shows that Tatum has about twice the Al per gram of clay. The difference is magnified with the whole soil acidity, which quantifies both exchangeable and non-exchangeable Al, as well as pH-dependent acidity.

The mean free Fe content of the control section (Tables 1 and 2) was found to be 14.7±8.7% Fe_2O_3 for all sixty profiles. The Tatum samples contained a greater average amount (16.0±1.2%) than the Elioak (13.3±1.6%). This large amount of Fe reflects the high structural Fe content of the parent material, rather than a history of extreme weathering conditions that are associated with oxidic soils of the tropics.

Particle Size

The data show the typical particle-size distribution for a upland Piedmont soil, where weathering has caused disintegration of sand-sized particles in the upper solum with eluviation of residual and authegenic clay-sized particles into the B horizon (Figure 5, Tables 7 and 8).

Elioak profiles contain more sand than the Tatum profiles. The largest difference (23% av.) is in the C horizon and is predominantly in the fine and very fine fractions. The Tatum profiles are more clayey. In the control section, the Tatum contains 13% (av.) more clay, while in the C horizon, the Tatum profiles contain 33.5±6.8% clay and the Elioak, 21±6.5%.

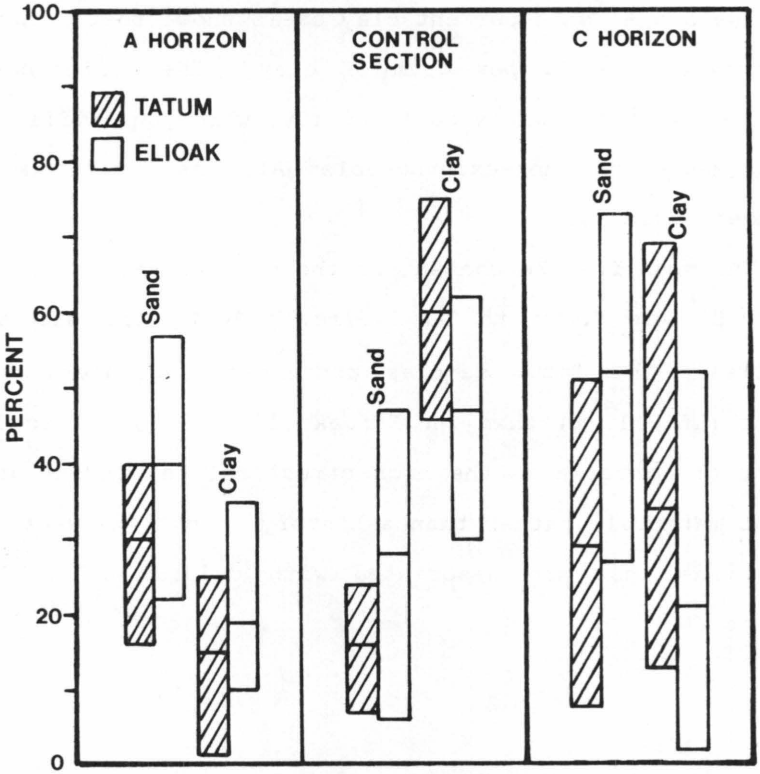

Figure 5. Mean and range of sand and clay content for the A and B horizons and control section for the profiles of the Tatum and Elioak mapping units.

Mineralogy

The complexity and number of mineral species increases with decreasing particle size. While the sand fraction contains predominantly primary minerals, the silt and clay fractions show an increase in secondary minerals.

Constituents comprising the sand fraction (Tables 9 and 10) represent both minerals resistant to breakdown and dissolution under the change in equilibrium conditions associated with weathering, and minerals which are sand-sized alteration products. The dominance of quartz in the sand fraction of both the control section and the C horizon indicates that quartz is resistant to weathering in the present Piedmont environment. Muscovite, on the other hand, is abundant, yet is less resistant than quartz. This trend is reflected with increased depth, where the relative

Table 7. Data summary of the particle size fractions of profiles in the Tatum mapping units by horizon and mineralogical control section.§

Variable	Horizon	Mean	Δ*	Min.	Max.
		------------percent-------------			
V.C. Sand	A	2.2	0.6	0.6	6.8
	C.S.	1.0	0.3	0.2	3.3
	C	1.6	0.6	0.1	7.1
C. Sand	A	3.2	0.6	1.4	5.9
	C.S.	1.6	0.2	0.6	3.3
	C	3.3	0.6	0.2	12.7
Med. Sand	A	4.5	0.6	2.7	7.0
	C.S.	2.0	0.2	1.0	3.6
	C	3.1	0.8	0.2	7.8
Fine Sand	A	8.8	1.7	3.6	14.4
	C.S.	4.2	0.7	1.7	6.7
	C	6.6	1.7	1.1	14.9
V.F. Sand	A	10.9	2.6	2.4	18.7
	C.S.	6.7	1.5	2.5	13.2
	C	14.8	4.7	3.2	39.9
Tot. Sand	A	29.7	4.5	16.3	40.4
	C.S.	15.5	2.2	7.3	23.9
	C	29.4	6.8	8.3	50.7
Silt	A	55.6	3.3	46.9	75.0
	C.S.	24.6	3.3	15.1	42.3
	C	37.1	3.8	16.5	56.7
Clay	A	14.8	2.5	0.6	24.6
	C.S.	59.9	4.2	45.8	75.3
	C	33.5	6.8	13.3	68.7

§C.S. = control section, V.C. = very coarse, C. = coarse, and V.F. = very fine.
*90% confidence interval is given by "mean ± Δ."

percent quartz decreases, and the muscovite content increases.

In the control section, the mean quartz content of the sand fraction is 91% in Tatum profiles and 76% in Elioak profiles. Similar amounts of muscovite mica occur in both

Table 8. Data summary of the particle size fractions of profiles in the Elioak mapping units by horizon and mineralogical control section.§

Variable	Horizon	Mean	Δ*	Min.	Max.
		------------percent-------------			
V.C. Sand	A	2.1	0.8	0.2	5.1
	C.S.	1.6	0.8	0.0	5.5
	C	2.4	1.1	0.0	6.3
C. Sand	A	3.8	1.8	0.6	10.2
	C.S.	2.5	1.3	0.2	7.3
	C	5.2	2.6	0.0	22.1
Med. Sand	A	6.7	3.0	1.4	15.8
	C.S.	3.9	2.0	0.6	10.8
	C	7.8	3.6	0.3	29.4
Fine Sand	A	13.5	2.3	7.3	19.9
	C.S.	7.9	1.8	1.2	14.3
	C	15.7	3.2	4.5	29.9
V.F. Sand	A	13.8	2.3	7.6	20.2
	C.S.	11.5	2.6	3.5	25.5
	C	21.3	5.7	2.5	43.6
Tot. Sand	A	40.0	5.7	21.9	56.9
	C.S.	27.4	5.3	5.9	47.5
	C	52.4	7.1	26.7	73.4
Silt	A	42.1	4.2	26.2	52.2
	C.S.	25.9	4.4	10.1	38.3
	C	26.6	5.7	11.2	49.6
Clay	A	17.9	3.6	10.4	35.3
	C.S.	46.8	4.6	30.1	61.6
	C	21.0	6.5	2.4	52.2

§C.S. = control section, V.C. = very coarse, C. = coarse, and V.F. = very fine.
*90% confidence interval is given by "mean ± Δ."

Table 9. Data summary of the sand fraction (2-0.05mm) mineralogy of the mineralogical control section for the profiles in the Tatum mapping units.

Variable	Mean	Δ*	Min.	Max.
	-------------percent-------------			
Quartz	90.8	5.4	55	98
Feldspar	0.7	0.2	0	2
Muscovite	0.4	0.2	0	2
Biotite	0.05	0.03	0	0.25
Heavy metals	1.6	1.9	0	14
Opaques	2.1	1.1	0	9
Rock Fragments	4.5	4.4	0	34

*The 90% confidence interval is given by "mean ± Δ."

soils. The mica content increases from 8% in the B horizon to 12% in the C for both soils, while the quartz content drops to 73% for Elioak and 64% for Tatum soils. Feldspar, opaque minerals, and unidentifiable rock fragments make up the remainder of the sand fraction.

Biotite, when present in the sand, has weathered predominantly to kaolinite. Optically, the mineral retains

Table 10. Data summary of the sand fraction (2-0.05mm) mineralogy of the mineralogical control section for the profiles in the Elioak mapping units.

Variable	Mean	Δ*	Min.	Max.
	-------------percent-------------			
Quartz	75.3	9.1	40	95
Feldspar	12.2	8.5	0	44
Muscovite	4.1	4.1	0	28
Biotite	1.8	1.8	0	12
Heavy metals	0.4	0.2	0	2
Opaques	4.3	2.3	0	15
Rock Fragments	1.9	1.6	0	17

*The 90% confidence interval is given by "mean ± Δ."

the brown, platy morphology of biotite, yet is found to have a 7Å d-spacing by XRD. The biotite is less resistant to weathering than muscovite due to the filling of all three octahedral cation sites, which decreases the ditrigonal rotation and bonding of the layers (Rich, 1972).

Feldspar is only a small constituent of the sand fraction in both the Tatum and Elioak profiles. Its occurrence may be due to lack of feldspar in the parent material or the alteration of this mineral to kaolinite, halloysite, quartz, gibbsite, and amorphous aluminosilicate minerals in the soil (Radoslovich, 1975; Calvert et al., 1980b).

The silt fraction of the control section (Tables 11 and 12) contains an increase in mica and a decrease in quartz relative to the sand. The average quartz content of the silt fraction of Tatum soils (66.1±8.1%) is greater than the Elioak soils (36.5±11.5%), while mica content is greatly decreased. Kaolinite and vermiculite make up an appreciable

Table 11. Data summary of the silt fraction (50-2μm) mineralogy of the mineralogical control section for the profiles in the Tatum mapping units.

Variable	Mean	Δ*	Min.	Max.
	------------	percent	------------	
Quartz	66.1	8.1	30	93
Feldspar	7.1	3.2	0	20
Mica	15.9	4.4	0	49
Kaolinite	6.0	2.4	0	17
Vermiculite	5.1	4.6	0	31

*The 90% confidence interval is given by "mean ± Δ."

Table 12. Data summary of the silt fraction (50-2μm) mineralogy of the mineralogical control section for the profiles in the Elioak mapping units.

Variable	Mean	Δ*	Min.	Max.
	-----------percent-------------			
Quartz	36.5	11.5	2	73
Feldspar	6.6	2.9	0	22
Mica	39.2	13.5	0	81
Kaolinite	13.7	5.7	0	45
Vermiculite	4.1	3.1	0	19

*The 90% confidence interval is given by "mean ± Δ."

portion of the silt in both soils, probably weathering products of the mica and feldspar.

The complexity of the mineral speciation increases greatly in the clay fraction (Tables 13 and 14). Kaolinite is the predominant mineral in the control section, averaging greater than 50% for both the Tatum and Elioak profiles. Other clay minerals include, in descending order, hydroxy-interlayered vermiculite, mica, quartz, and gibbsite.

Table 13. Data summary of the clay fraction (<2μm) mineralogy of the mineralogical control section for the profiles in the Tatum mapping units.

Variable	Mean	Δ*	Min.	Max.
	-----------percent-------------			
Kaolinite	58.8	6.2	37	80
Gibbsite	2.7	1.2	0	6
Hyd-int. verm	17.7	3.0	5	28
Mica	5.7	1.8	1	14
Quartz	4.9	0.9	3	8
Vermiculite	9.9	3.0	2	24

*The 90% confidence interval is given by "mean ± Δ."

Table 14. Data summary of the clay fraction (<2µm) mineralogy of the mineralogical control section for the profiles in the Elioak mapping units.

Variable	Mean	Δ*	Min.	Max.
	-----------	percent	------------	
Kaolinite	54.6	3.9	40	68
Gibbsite	4.2	2.1	0	16
Hyd-int. verm	17.9	4.1	8	36
Mica	5.7	1.8	2	15
Quartz	6.3	1.5	3	10
Vermiculite	10.8	3.5	0	23

*The 90% confidence interval is given by "mean ± Δ."

Several samples have a small amount of montmorillinite and feldspar.

While exhibiting the same mineralogical constituents and trends as the control section, the C horizon shows an increase in kaolinite. This result has been found by other workers on Piedmont soils (Bryant and Dixon, 1964; Leith and Craig, 1965; Calvert et al., 1980a), though Leith and Craig (1965) warn that the decrease in kaolinite in the upper solum may reflect the relative increase of other clay minerals and not an actual decrease in absolute abundance of kaolinite.

Stability series (Goldich, 1938; Barshad, 1955) and weathering sequences (Jackson et al., 1948; Jackson, 1968) can be used to explain mineralogical transformations within the soil profile. The parent materials contained large amounts of muscovite and biotite mica, quartz, and feldspars. After weathering, the sand fraction is predominantly quartz, with lesser amounts of muscovite mica and feldspar. The biotite has generally altered to kaolinite. These trends follow the established stability series based on chemical composition and mineralogical structure (Goldich, 1938).

As particle size decreases, the relative abundance of mica to quartz increases. Jackson et al. (1948) reported this phenomenon as a general trend in soils. They stated that the relative abundance of a mineral in the smaller size fraction was proportional to chemical resistance. This increase in mica has been attributed to the stabilizing effect of Si:Al layers of mica (Buol et al., 1973) and increased solubility of quartz with decreasing particle size. Reichenback and Rich (1975) reasoned that the amount of mica that remains in any soil is influenced by the original concentration present, texture, and chemical composition of the parent material. The original particle-size distribution of minerals in parent materials will play an important part in the distribution of minerals in soils.

Jackson's weathering index (Jackson et al., 1948; Jackson, 1968) shows the gradual alteration of primary minerals to 2:1 and 1:1 secondary phyllosilicates, with eventual transformation to gibbsite. This sequence is directly tied to the decreasing Si content of the soil solution as weathering proceeds.

While the synthesis of soil minerals can be presented in this manner, the exact species formed is related to the solution constituents and conditions of the soil microenvironment where precipitation or transformation occurs (Jackson, 1968; Marshall, 1977). It is therefore conceivable that any secondary minerals of Jackson's sequence may form or dissolve at any time, and may not necessarily follow the established sequence.

Statistical Analysis

Analysis of variance was used to evaluate statistical differences among sites within the Tatum and Elioak soils, denoted by sites(soils), and among soils for the measured properties (Tables 15-21). Differences among sites(soils) are evaluated by an F test using residual variation. Differences among soils are evaluated by an F test using the mean square for sites (soils).

The value of $\alpha(F)$ for the respective variables indicates the probability of rejecting a true null hypothesis that the means of a variable between groups are equal. In other words, the probability levels indicate the level of significance for the test of soils or for sites

Table 15. Statistical comparison of free Fe oxides in the mineralogical control section, the A horizon thickness, and solum depth for profiles in the Tatum and Elioak mapping units.§

Variable	Soil		Site		Error
	$\alpha(F)$	$\%\alpha^2$	$\alpha(F)$	$\%\alpha^2$	$\%\alpha^2$
Free Fe ($\%Fe_2O_3$)	0.02	31	0.01	48	21
A hor. thickness	0.25	3	0.01	67	30
Solum depth	**	--	0.01	82	18

§$\alpha(F)$ = the probability that the difference is greater than the F-statistic and $\%\alpha^2$ = the percent of the total variance that is attributed by each variance component.
**denotes F-ratio less than 1.

within soils. In the analysis of variance, the lack of descending mean squares resulted in some F ratios <1 and consequently negative variance estimates. These are noted in the various tables by an asterisk.

Table 16 shows that the $\alpha(F)$ of soils for the percent base saturation in the C horizon is 0.01. This value indicates that there is a very good chance that profiles

Table 16. Statistical comparison of the chemical parameters of the profiles in the Tatum and Elioak mapping units by horizon and chemical control section.§

Variable	Horizon	Soil		Site		Error
		$\alpha(F)$	$\%\alpha^2$	$\alpha(F)$	$\%\alpha^2$	$\%\alpha^2$
pH	A	0.25	4	0.01	85	11
	B	0.11	11	0.01	48	41
	C	0.10	12	0.01	41	47
	C.S.	**	--	0.01	85	15
Ca	A	**	--	0.01	77	23
	B	0.19	7	0.01	73	20
	C	0.02	14	**	--	86
	C.S.	0.06	12	0.15	12	76
Mg	A	0.19	7	0.01	85	8
	B	**	--	0.01	65	35
	C	0.12	10	0.01	40	50
	C.S.	0.17	6	0.01	37	57
K	A	0.21	4	0.01	36	60
	B	**	--	0.01	55	45
	C	0.01	49	0.01	41	10
	C.S.	0.30	1	0.01	62	37
%B.S.	A	**	--	0.01	86	14
	B	0.05	23	0.01	64	13
	C	0.01	40	0.05	13	47
	C.S.	0.02	27	0.01	33	40

§$\alpha(F)$ = the probability that the difference is greater than the F-statistic, $\%\alpha^2$ = the percent of the total variance that is attributed by each variance component, and C.S. = control section.
**denotes F-ratio less than 1.

sampled and analyzed from these two groups of mapping units named Tatum and Elioak will be different. Likewise, there is also a good chance ($\alpha(F) = 0.06$) that Ca in the control section will be different for Tatum and Elioak profiles.

The calculation of $\alpha(F)$ may be used to indicate which properties are the most important for distinguishing the two groups of profiles (Tatum and Elioak). Those properties were found to be:

1. Percent base saturation
2. Potassium in the C horizon
3. Exchangeable hydrogen and aluminum
4. Whole soil aluminum
5. Medium and very fine sand in the control section

Table 17. Statistical comparison of the exchangeable Al and H by horizon and chemical control section and whole soil Al in the mineralogical control section for profiles in the Tatum and Elioak mapping units.§

Variable	Horizon	Soil		Site		Error
		$\alpha(F)$	$\%\alpha^2$	$\alpha(F)$	$\%\alpha^2$	$\%\alpha^2$
Al	A	**	--	0.01	87	13
	B	0.01	55	0.01	35	10
	C	0.01	56	0.01	37	7
	C.S.	0.02	23	0.01	24	53
H	A	**	--	0.01	75	25
	B	0.01	65	0.01	23	12
	C	0.01	41	0.01	39	20
	C.S.	0.01	38	0.01	28	34
WS. Al	C.S.	0.01	76	0.01	8	16

§$\alpha(F)$ = the probability that the difference is greater than the F-statistic, $\%\alpha^2$ = the percent of the total variance that is attributed by each variance component, C.S. = control section, and WS = whole soil.
**denote F-ratio less than 1.

6. Total sand
7. Silt content of the A horizon
8. Clay content of the control section
9. Quartz and mica content of the silt fraction
10. Quartz and feldspar content of the sand fraction

Table 18. Statistical comparison of the particle size fractions of the profiles in the Tatum and Elioak mapping units.§

Variable	Horizon	Soil		Site		Error
		α(F)	%α²	α(F)	%α²	%α²
V.C. Sand	A	**	--	0.01	64	36
	C.S.	0.22	4	0.01	58	38
	C	0.29	1	0.01	53	46
C. Sand	A	**	--	0.01	96	4
	C.S.	0.22	5	0.01	78	17
	C	0.23	1	0.01	59	37
Med. Sand	A	0.19	7	0.01	90	3
	C.S.	0.01	17	0.01	77	6
	C	0.03	26	0.01	49	25
Fine Sand	A	0.01	43	0.01	53	4
	C.S.	0.01	46	0.01	38	16
	C	0.01	60	0.01	26	14
V.F. Sand	A	0.14	11	0.01	83	6
	C.S.	0.01	41	0.01	47	12
	C	0.13	11	0.01	58	31
Tot. Sand	A	0.02	36	0.01	62	3
	C.S.	0.01	53	0.01	35	12
	C	0.01	58	0.01	29	13
Silt	A	0.01	63	0.01	29	8
	C.S.	**	--	0.01	69	31
	C	0.03	23	0.01	33	44
Clay	A	0.21	5	0.01	63	32
	C.S.	0.01	52	0.01	31	17
	C	0.03	28	0.01	49	23

§α(F) = the probability that the difference is greater than the F-statistic, %α² = the percent of the total variance that is attributed by each variance component, C.S. = control section, V.C. = very coarse, C. = coarse, and V.F. = very fine.
**denotes F-ratio less than 1.

Table 19. Statistical comparison of the sand fraction (2-0.05mm) mineralogy of the mineralogical control section for profiles in the Tatum and Elioak mapping units.§

Variable	Soil		Site		Error
	$\alpha(F)$	$\%\alpha^2$	$\alpha(F)$	$\%\alpha^2$	$\%\alpha^2$
Quartz	0.02	36	0.01	55	9
Feldspar	0.02	33	0.01	65	2
Muscovite	0.11	14	0.01	73	13
Biotite	0.08	17	0.01	60	23
Heavy Metals	0.29	2	0.01	89	9
Opaques	0.13	11	0.01	64	25
Rock Fragments	0.32	1	0.01	69	30

§$\alpha(F)$ = the probability that the difference is greater than the F-statistic and $\%\alpha^2$ = the percent of the total variance that is attributed by each variance component.

These calculation reaffirm the differences found between the means of these parameters and better quantifies the extent of the differences.

The low probabilities of $\alpha(F)$ for the sites show that, for all parameters, there are no differences between sites within the mapping units of Tatum or Elioak. This result

Table 20. Statistical comparison of the silt fraction (50-2µm) mineralogy of the mineralogical control section for profiles in the Tatum and Elioak mapping units.§

Variable	Soil		Site		Error
	$\alpha(F)$	$\%\alpha^2$	$\alpha(F)$	$\%\alpha^2$	$\%\alpha^2$
Quartz	0.01	51	0.01	32	17
Feldspar	**	--	0.01	56	44
Mica	0.01	41	0.01	47	12
Kaolinite	0.04	22	0.01	43	35
Vermiculite	**	--	0.01	75	25

§$\alpha(F)$ = the probability that the difference is greater than the F-statistic and $\%\alpha^2$ = the percent of the total variance that is attributed by each variance component.
**denotes F-ratio less than 1.

Table 21. Statistical comparison of the clay fraction (<2μm) mineralogy of the mineralogical control section for profiles in the Tatum and Elioak mapping units.§

Variable	Soil		Site		Error
	$\alpha(F)$	$\%\alpha^2$	$\alpha(F)$	$\%\alpha^2$	$\%\alpha^2$
Kaolinite	0.31	1	0.01	78	21
Gibbsite	0.28	2	0.01	87	11
Hyd-int. Verm.	**	--	0.01	73	27
Mica	**	--	0.01	68	32
Quartz	0.15	9	0.01	63	28
Vermiculite	**	--	0.01	79	21

§$\alpha(F)$ = the probability that the difference is greater than the F-statistic and $\%\alpha^2$ = the percent of the total variance that is attributed by each variance component.
**denotes F-ratio less than 1.

indicates that county to county differences between the profiles of Tatum or Elioak are small and the mapping of soils delineated as Tatum or Elioak was consistent between counties.

Examination of $\%\sigma^2$, the percent of the total variance contributed by each component in the nested analysis of variance design, indicates where significant portions of the variation occur. Large values of error variance indicate large amounts of short range soil variability and/or other unexplained variation. These variations appear large for such values as Ca in the control section (76%) or for very coarse sand in the A horizon (61%). For others, the value is smaller, indicating more long-range soil variability.

Since the greatest variance for Ca in the control section is contributed by short-range soil heterogenity, the variance between sites within a particular soil (Tatum or Elioak), or between types of soils are low, both 12%. In contrast, the error variance for K in the C horizon is only 10%, while variance increases to 41% for sites within soils and to 49% for variance between soils.

Taxonomic Classification

The soil taxonomic classification (Soil Survey Staff, 1975) of each profile has been established to the family level (Tables 22 and 23). All profiles are classified as Typic Hapludults. Based on available weather data, the temperature regime for all sites is mesic. This conclusion is based on the mean annual air temperature, to which 1°C is added to approximate the mean annual soil temperature (Soil Survey Staff, 1975).

Family-level differences were found for the mineralogical and particle-size classes. The sandier nature of the Elioak soils resulted in three profiles being classified as fine-loamy in texture, the remainder being in the clayey particle-size class. All of the Tatum soils are classified as clayey. Greater diversity came in the mineralogical family class, where the Tatum soils were placed into mixed, kaolinitic, or oxidic classes. This diversity was true of the Elioak profiles, though the number of soils classed as oxidic increased due to the lower clay and higher gibbsite content. The value of the oxidic ratio (%Al_2O_3 ± %Fe_2O_3 / %clay) is established at 0.2 by Soil Taxomomy (Soil Survey Staff, 1975). As stated previously, the high Fe content of the parent material (along with <90% quartz in the sand fraction) has resulted in several

Table 22. Taxonomic classification of soil profiles in the Tatum mapping units.

Site	Profile	Classification
1	1	Clayey, oxidic, mesic, Typic Hapludult
1	2	Clayey, oxidic, mesic, Typic Hapludult
1	3	Clayey, oxidic, mesic, Typic Hapludult
2	1	Clayey, oxidic, mesic, Typic Hapludult
2	2	Clayey, oxidic, mesic, Typic Hapludult
2	3	Clayey, oxidic, mesic, Typic Hapludult
3	1	Clayey, kaolinitic, mesic, Typic Hapludult
3	2	Clayey, kaolinitic, mesic, Typic Hapludult
3	3	Clayey, kaolinitic, mesic, Typic Hapludult
4	1	Clayey, mixed, mesic, Typic Hapludult
4	2	Clayey, kaolinitic, mesic, Typic Hapludult
4	3	Clayey, kaolinitic, mesic, Typic Hapludult
5	1	Clayey, kaolinitic, mesic, Typic Hapludult
5	2	Clayey, kaolinitic, mesic, Typic Hapludult
5	3	Clayey, kaolinitic, mesic, Typic Hapludult
6	1	Clayey, kaolinitic, mesic, Typic Hapludult
6	2	Clayey, kaolinitic, mesic, Typic Hapludult
6	3	Clayey, kaolinitic, mesic, Typic Hapludult
7	1	Clayey, mixed, mesic, Typic Hapludult
7	2	Clayey, mixed, mesic, Typic Hapludult
7	3	Clayey, oxidic, mesic, Typic Hapludult
8	1	Clayey, oxidic, mesic, Typic Hapludult
8	2	Clayey, oxidic, mesic, Typic Hapludult
8	3	Clayey, oxidic, mesic, Typic Hapludult
9	1	Clayey, kaolinitic, mesic, Typic Hapludult
9	2	Clayey, kaolinitic, mesic, Typic Hapludult
9	3	Clayey, kaolinitic, mesic, Typic Hapludult
10	1	Clayey, oxidic, mesic, Typic Hapludult
10	2	Clayey, oxidic, mesic, Typic Hapludult
10	3	Clayey, oxidic, mesic, Typic Hapludult

Table 23. Taxonomic classification of soil profiles in the Elioak mapping units.

Site	Profile	Classification
1	1	Clayey, oxidic, mesic, Typic Hapludult
1	2	Clayey, kaolinitic, mesic, Typic Hapludult
1	3	Clayey, oxidic, mesic, Typic Hapludult
2	1	Clayey, kaolinitic, mesic, Typic Hapludult
2	2	Clayey, oxidic, mesic, Typic Hapludult
2	3	Clayey, oxidic, mesic, Typic Hapludult
3	1	Clayey, oxidic, mesic, Typic Hapludult
3	2	Clayey, oxidic, mesic, Typic Hapludult
3	3	Clayey, oxidic, mesic, Typic Hapludult
4	1	Clayey, mixed, mesic, Typic Hapludult
4	2	Clayey, kaolinitic, mesic, Typic Hapludult
4	3	Clayey, kaolinitic, mesic, Typic Hapludult
5	1	Clayey, kaolinitic, mesic, Typic Hapludult
5	2	Clayey, oxidic, mesic, Typic Hapludult
5	3	Fine loamy, oxidic, mesic, Typic Hapludult
6	1	Clayey, oxidic, mesic, Typic Hapludult
6	2	Clayey, oxidic, mesic, Typic Hapludult
6	3	Clayey, oxidic, mesic, Typic Hapludult
7	1	Clayey, oxidic, mesic, Typic Hapludult
7	2	Clayey, oxidic, mesic, Typic Hapludult
7	3	Clayey, oxidic, mesic, Typic Hapludult
8	1	Clayey, oxidic, mesic, Typic Hapludult
8	2	Clayey, oxidic, mesic, Typic Hapludult
8	3	Fine loamy, oxidic, mesic, Typic Hapludult
9	1	Clayey, oxidic, mesic, Typic Hapludult
9	2	Clayey, oxidic, mesic, Typic Hapludult
9	3	Clayey, oxidic, mesic, Typic Hapludult
10	1	Clayey, oxidic, mesic, Typic Hapludult
10	2	Clayey, oxidic, mesic, Typic Hapludult
10	3	Fine loamy, oxidic, mesic, Typic Hapludult

profiles being classified as oxidic. In this case, the classification of oxidic mineralogy should not reflect a more extreme state of weathering than soils in the mineralogical classes of mixed or kaolinitic.

This diversity of family classes for the different sites, as well as the profiles within a site, shows that classification based on a single profile may be in error. From this study, it would appear difficult to have confidence in the classification of a delineation by examination of only one profile. Short range variability tends to be extreme enough to create changes in family classes within only a few feet.

CONCLUSIONS

Characterization of profiles selected at random from soil mapping units of Tatum and soil mapping units of Elioak has enabled us to examine a cross section of soils mapped and correlated as Tatum and Elioak. The different parent materials on which these soils have formed have yielded amazingly similar characteristics, yet differences between profiles in Tatum and Elioak mapping units do exist. The Tatum soils were determined to have a thicker solum, greater clay content, higher soil acidity, and conversely, lower base saturation than the Elioak soils. Mineralogically, the soils are most similar in the clay fraction, being predominantly kaolinitic, with lesser amounts of hydroxy-interlayered vermiculite, vermiculite, mica, quartz, and gibbsite.

Statistical evaluation shows that variability can be as extensive within 7m as it is between sites. This variability is reflected in the taxonomic classification, in which it was found that different family classes can result even within the same delineation. It is therefore recommended to take samples from the area surrounding a "typifying pedon" in order to more accurately characterize and classify the soil.

Examination of these profiles in the field by soil scientists has shown that perspectives play a significant role in the evaluation of morphologic features. On the field trip, each person had an opinion as to which series concept a particular soil represented. Profiles varied due to parent material, the presence of old alluvial cappings, or other morphologic features, which influenced the opinions of the type of soil (series concept) actually present. Yet, while it was felt by some that certain profiles did not fit the series concepts of Tatum or Elioak, it should by noted that this was a study of the characteristics of soils that compose mapping units correlated as Tatum and Elioak. The present study made it possible to gain more knowledge of what these mapping units actually contained.

The field trip emphasized the presence of overlays on the landscape and their influence on soil properties. In areas of the Piedmont, overlays may affect use and management, but there is a need for more studies on difference in land use that could be made between soil of residual origin versus those soils formed in transported sediments. It is possible that some of the land could be used more productively if differentiating soil characteristics were found and could be used to map the soils. The full extent of alluvial cappings in the Piedmont is yet unknown.

This study has, overall, provided a better view of soils in the Virginia Piedmont. The morphological and mineralogical similarities in the clay fraction are offset by differences in the chemical and physical properties. The extent that these differences alter the use and management of each soil will decide the need to continue separation of soils such as these in mapping of second-order soil surveys. This reasoning also applies to the separation of soils formed in alluvial deposits, such as Brockroad and Catharpin, versus the soils of residual origin.

Scale of mapping, time, cost, and prospective use of the soil survey will also need to be evaluated in order to decide the extent of subdivision of soil bodies on a map. Urban use of soils is very site-specific and requires a more defined mapping unit and a better separation of variability. It can be seen from this study that an on-site investigation of the soil is the best method for complete assurance that soil properties will be suitable for the required use. Therefore, the survey need not delineate all the soil components, but make known in the description the full extent of the variability and inclusions so users can be aware of the characteristics of a particular soil mapping unit.

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APPENDIX

Site descriptions

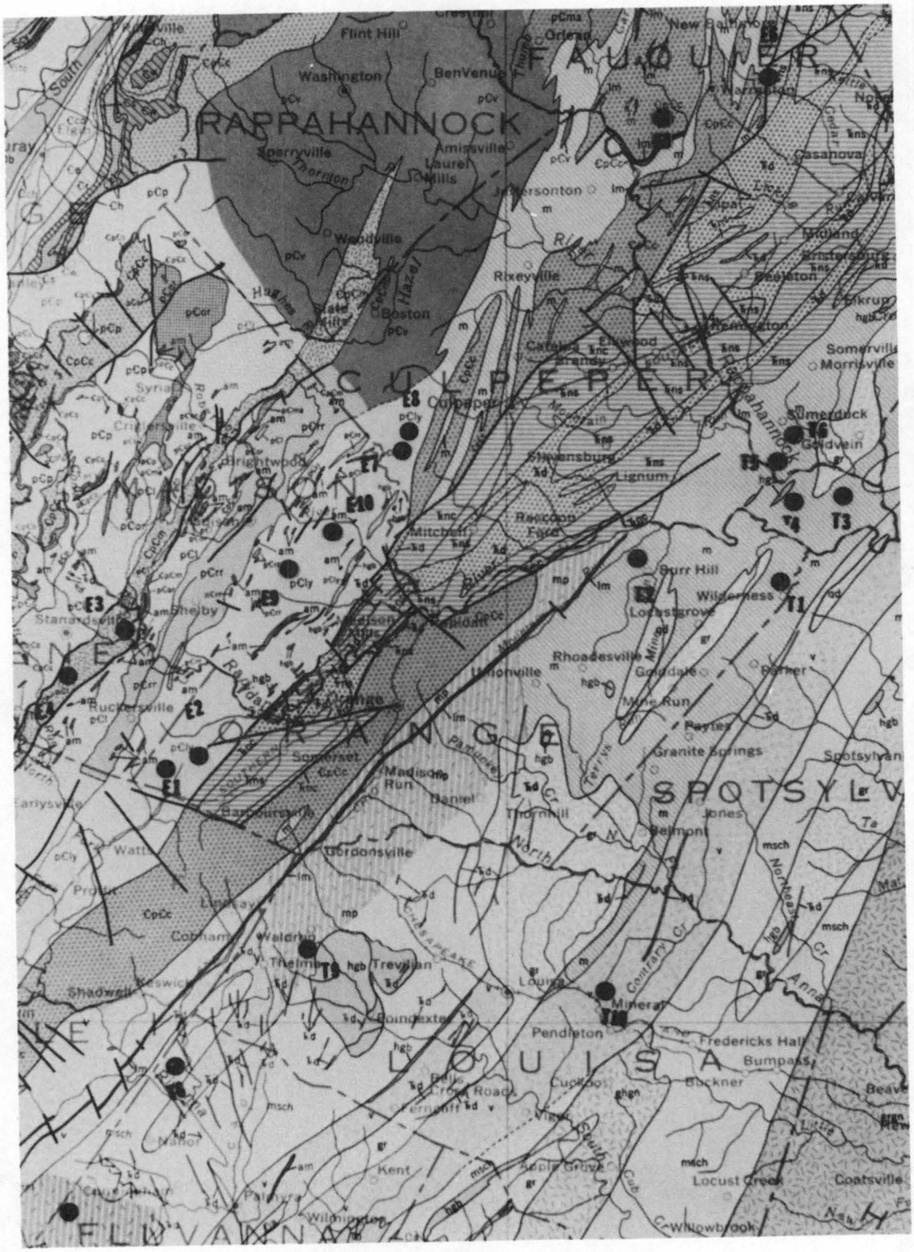
Maps

Soil Survey
Topographic
Geologic

Profiles descriptions

Laboratory Data

Chemistry
Particle size
Mineralogy



<u>Geology</u> <u>map</u> <u>of</u> <u>Virginia</u>. (<u>1</u>:<u>500</u>,<u>000</u>)

m = metamorphosed sedimentary rock (Wissahickon schist and granite gneiss)

mp = metamorphosed sedimentary rock (phyllite)

msch = metamorphosed sedimentary rock (schist)

Pze = Evington group

v = metamorphosed volcanic and sedimentary

pCly = Lynchburg formation

CpCm = Mechums River formation

CpCc = Catoctin formation

Tatum Site 1

Location: Orange County, Virginia; 1600 ft. NE of Rts. 3 and 667; 3550 ft. NNW of Rts. 20 and 3 at Wilderness; 30 ft. N of Rt. 667.
Elevation: 340 ft.

Vegetation: Shortleaf pine and few mixed hardwoods

Drainage: Well

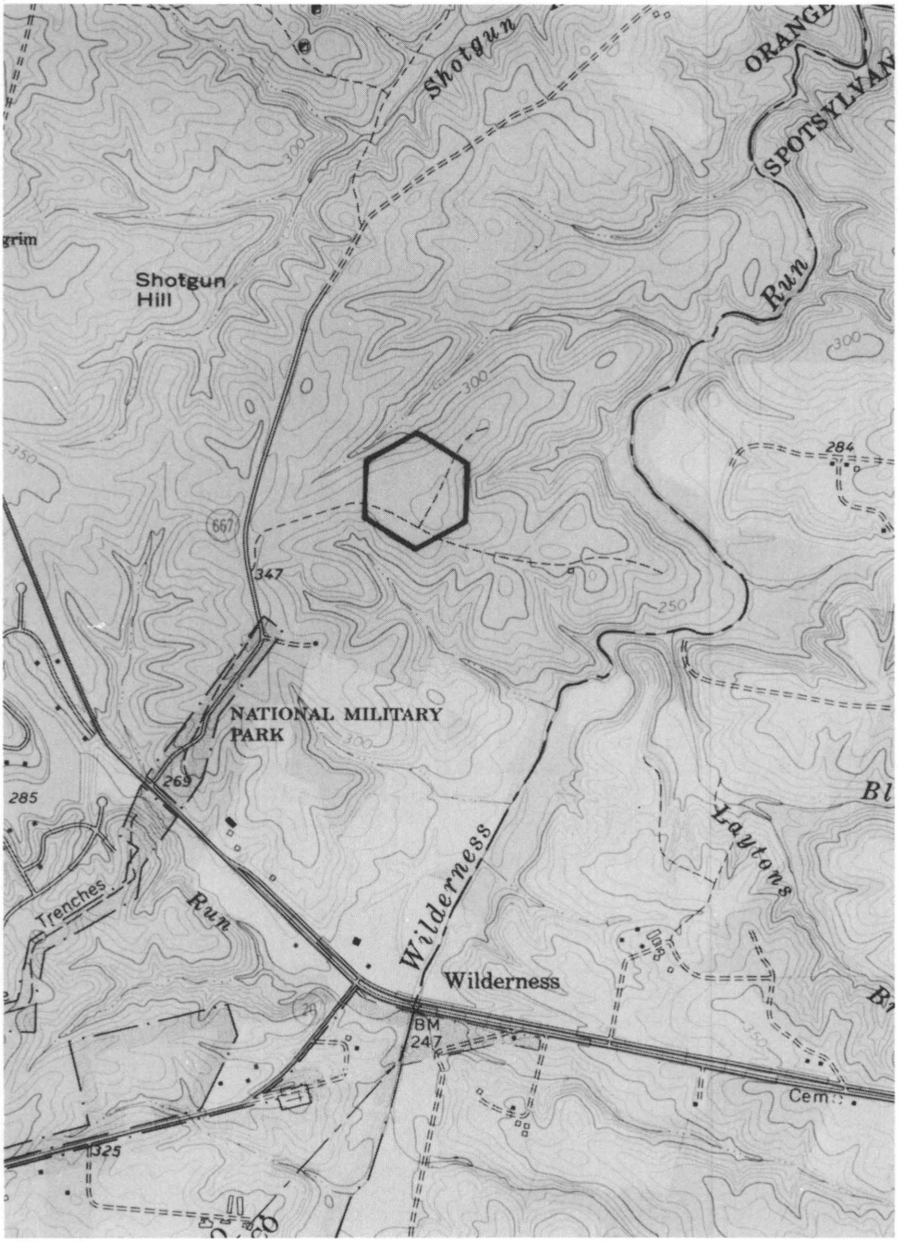
Classification: Typic Hapludult, clayey, oxidic, mesic

Comments: Looks like the Cullen series; excellent tree growth; near gold mine pit.

Trip Comments: The site has more silt and thicker solum than many of the Elioak sites. The location is in the gold pyrite belt, but some members thought that the soil may be too good for Tatum, possibly because of an overlay. Series names presented were Catharpin and Georgeville.

Tatum Site 1. Orange County soil survey.
Map sheet 9. (1:15,840)

TsB2 = Tatum silt loam, 2-7% slopes, eroded
TsC2 = Tatum silt loam, 7-15% slopes, eroded
NsB2 = Nason loam, 2-7% slopes, eroded
MrD = Manteo silt loam, 15-25% slopes
TtB3 = Tatum silty clay loam, 2-7% slopes, severely eroded



Tatum Site 1. Orange County.
Topographic map (1:24,000)
Chancellorsville quadrangle.

PROFILE 1 (T1-1)

Ap--0 to 12 cm, strong brown (7.5YR 5/6) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 20% angular fragments of quartz.

B2t--12 to 160 cm, dark red (2.5YR 3/6) clay; moderate, fine, subangular blocky structure; friable, sticky, plastic; thick, continuous clay films; 10% angular fragments of quartz in upper B2t.

C--160 to 183 cm, yellowish red (5YR 5/6) sandy clay loam; few, fine and medium, distinct mottles of red (2.5YR 4/6) and strong brown (7.5YR 5/8); structureless massive; friable.

PROFILE 2 (T1-2)

Ap--0 to 10 cm, strong brown (7.5YR 5/6) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 20% angular fragments of quartz.

B2t--10 to 150 cm, dark red (2.5YR 3/6) clay; common, medium, distinct mottles of yellowish red (5YR 5/8) in lower B2t; moderate, fine and medium, subangular blocky structure; friable, sticky, plastic; thick, continuous clay films.

C--150 to 183 cm, red (2.5YR 4/6) silty clay loam; common, medium, distinct mottles of dark red (2.5YR 3/6) and yellowish red (5YR 5/8); structureless massive; friable, slightly sticky, slightly plastic.

PROFILE 3 (T1-3)

Ap--0 to 15 cm, strong brown (7.5YR 5/6) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz.

B2t--15 to 132 cm, red (2.5YR 4/6) to dark red (2.5YR 3/6) clay; common, medium and coarse mottles of yellowish red (5YR 5/8) and yellowish brown (10YR 5/8); moderate, fine and medium, subangular blocky structure; friable, sticky, plastic; thick, continuous clay films; 5% angular fragments of quartz.

C--132 to 150 cm, red (2.5YR 4/6) silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6); structureless massive; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz.

Tatum Site 1

ori-on	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				T1-1					
	4.10	0.77	0.34	0.20	12.80	1.75	1.31	14.11	9.28
	4.24	0.81	0.88	0.21	14.00	3.65	1.90	15.90	11.95
	4.31	0.06	0.20	0.02	10.00	3.45	0.28	10.28	2.72
o.Se.	3.80	0.11	0.33	0.11	12.40	4.15	0.55	12.95	4.25
				T1-2					
	3.81	0.23	0.26	0.25	19.40	3.85	0.74	20.14	3.67
	4.35	0.09	0.76	0.33	13.00	3.75	1.18	14.18	8.32
	4.40	0.07	0.21	0.09	10.40	3.55	0.37	10.77	3.44
o.Se.	4.12	0.09	0.35	0.19	11.40	2.65	0.63	12.03	5.24
				T1-3					
	4.37	0.79	0.57	0.28	13.60	2.15	1.64	15.24	10.76
	4.72	0.34	1.07	0.26	10.80	2.85	1.67	12.47	13.39
	4.78	0.05	0.22	0.04	9.00	3.65	0.31	9.31	3.33
o.Se.	4.34	0.16	0.22	0.06	7.80	2.65	0.44	8.24	5.34

Tatum Site 1

	Sand								
Horizon	VC	C	M	F	VF	Total	Silt	Clay	Textural Class
	percent								
				T1-1					
A	0.6	1.4	2.7	5.4	6.1	16.3	63.1	20.6	sil
Co.Se.	3.3	3.3	1.7	3.7	3.7	15.6	33.8	50.6	c
C	0.1	0.4	0.9	3.3	5.8	10.5	61.7	27.8	c
				T1-2					
A	4.2	3.9	3.9	3.6	2.4	18.0	60.4	21.7	sil
Co.Se.	0.3	1.3	2.7	6.7	8.7	19.8	30.1	50.1	c
C	0.1	0.7	1.8	4.7	4.7	12.0	56.7	31.2	sicl
				T1-3					
A	3.6	1.7	6.1	3.6	2.8	17.8	57.6	24.6	sil
Co.Se.	0.5	1.2	2.1	5.4	9.0	18.2	34.2	47.5	c
C	1.6	3.1	3.2	6.1	8.5	22.6	40.6	36.8	cl

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
T1-1	98	--	Tr	Tr	--	2	--
T1-2	97	1	--	--	--	2	--
T1-3	98	--	--	--	--	2	--
T1-1(C)	84	Tr	1	Tr	Tr	12	3

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
T1-1	78	5	5	7	5
T1-2	73	4	10	8	5
T1-3	78	1	10	7	5

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
T1-1	8	4	69	4	14	1	--	--
T1-2	8	2	71	3	15	1	--	--
T1-3	8	2	69	2	18	1	--	--
T1-1(C)	Tr	--	76	Tr	24	--	--	Tr

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont
	percent									
T1-1	45.7	1.7	3.7	37.3	3.7	7.1	0.5	0.3	--	--
T1-2	45.0	1.4	4.0	38.0	3.0	7.5	0.5	0.4	--	--
T1-3	48.3	0.3	4.3	35.2	2.6	8.6	0.5	0.4	--	--

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
T1-1	17.4	9.6	0.35
T1-2	18.5	7.8	0.38
T1-3	15.7	8.6	0.34

Tatum Site 2

Location: Orange County, Virginia; 6,500 ft. NW of Burr Hill on Rt. 611; 350 ft. N of Gospel Tabernacle.
Elevation: 385 ft.

Vegetation: Mixed Hardwoods and pines

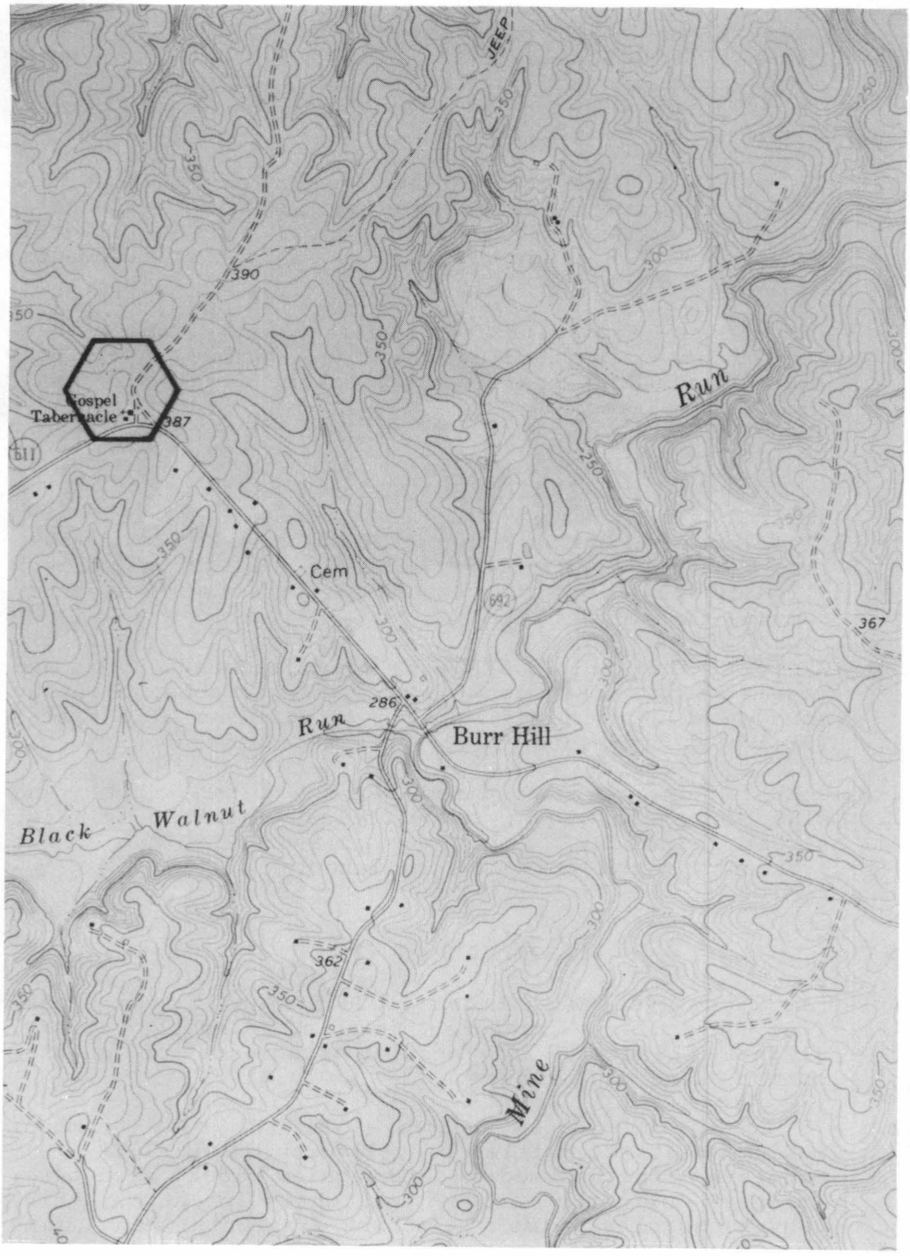
Parent Material: Mica schist (sericite)

Drainage: Well

Classification: Typic Hapludult, clayey, oxidic, mesic

Trip Comments: The site position suggests an overlay. Some members believed it to have 20 to 30 inches of overlay and belong to the Catharpin series. The Al content is slightly higher than at Tatum Site 1.

Tatum Site 2. Orange County soil survey.
Map sheet 7. (1:15,840)
TsB2 = Tatum silt loam, 2-7% slopes, eroded
NsB2 = Nason silt loam, 2-7% slopes, eroded



Tatum Site 2. Orange County.
Topographic map (1:24,000)
Mine Run quadrangle.

PROFILE 1 (T2-1)

Ap--0 to 17 cm, yellowish brown (10YR 5/6) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic, 10% angular fragments of quartz; common, fine mica flakes.

B2t--17 to 76 cm, red (2.5YR 4/6) clay; many multicolored schist fragments; weak, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thin, patchy clay films; 15% schist fragments; many, fine mica flakes.

C--76 to 150 cm, variegated red, yellow, brown, white, blue clay loam; structureless massive; friable, slightly sticky, slightly plastic; 30% schist fragments; many, fine mica flakes.

PROFILE 2 (T2-2)

Ap--0 to 27 cm, yellowish brown (10YR 5/6) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz; common, fine mica flakes.

B2t--27 to 119 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thin, continuous clay films; 10% schist fragments; many, fine mica flakes.

C--119 to 150 cm, variegated red, yellow, brown, white, and blue silty clay loam; structureless massive; friable, slightly sticky, slightly plastic; 30% schist fragments; many, common mica flakes.

PROFILE 3 (T2-3)

Ap--0 to 25 cm, yellowish brown (10YR 5/6) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz; common, fine mica flakes.

B2t--25 to 80 cm, yellowish red (5YR 5/8) clay; common, medium, distinct mottles of yellowish brown (10YR 6/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thin, continuous clay films; 5% schist fragments; many, fine mica flakes.

C--80 to 150 cm, variegated red, yellow, brown, white, and blue clay loam; structureless massive; friable, slightly sticky, slightly plastic; 35% schist fragments; many, fine mica flakes.

Tatum Site 2

Hori-zon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				T2-1					
A	4.01	0.23	0.13	0.23	16.60	4.05	0.59	17.19	3.43
B	4.87	0.08	1.44	0.37	15.20	4.95	1.89	17.09	11.06
C	5.02	0.04	0.21	0.15	9.60	3.25	0.40	10.00	4.00
Co.Se.	4.42	0.10	0.11	0.20	7.80	2.55	0.41	8.21	4.99
				T2-2					
A	4.20	0.10	0.09	0.17	10.00	2.55	0.36	10.36	3.47
B	5.05	0.07	0.64	0.40	15.20	4.95	1.11	16.31	6.81
C	4.99	0.08	0.17	0.11	9.20	3.45	0.36	9.56	3.77
Co.Se.	4.68	0.11	0.20	0.17	4.40	1.65	0.48	4.88	9.84
				T2-3					
A	4.00	0.16	0.11	0.27	16.40	3.65	0.54	16.94	3.19
B	4.98	0.10	0.96	0.42	15.40	4.35	1.48	16.88	8.77
C	4.98	0.08	0.41	0.20	11.20	4.15	0.69	11.89	5.80
Co.Se.	4.70	0.12	0.15	0.23	10.20	3.55	0.50	10.70	4.67

Tatum Site 2

Horizon	Sand VC	C	M	F	VF	Total	Silt	Clay	Textural Class
	percent								
				T2-1					
A	3.1	2.3	3.5	4.7	4.8	18.6	60.2	21.2	sil
Co.Se.	1.0	1.8	2.6	5.1	7.3	17.8	29.9	52.3	c
C	0.2	1.0	1.7	4.6	13.5	21.0	46.1	33.0	cl
				T2-2					
A	2.0	2.7	3.3	5.3	5.5	19.0	66.7	14.4	sil
Co.Se.	0.3	1.0	2.8	6.3	8.4	18.8	18.3	62.9	c
C	1.0	1.4	1.2	2.8	10.7	17.2	53.0	29.8	sicl
				T2-3					
A	1.2	2.7	4.1	5.1	5.0	18.0	66.5	15.5	sil
Co.Se.	0.6	1.2	1.6	4.9	10.4	18.8	28.9	52.3	c
C	3.3	6.3	3.8	4.9	7.8	26.0	36.9	37.0	cl

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
T2-1	55	0.5	1.5	Tr	Tr	9	34
T2-2	73	--	Tr	Tr	Tr	4	23
T2-3	86	Tr	Tr	--	1	3	10
T2-1(C)	54	--	1	Tr	--	7	38

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
T2-1	52	11	30	5	2
T2-2	60	10	24	4	2
T2-3	73	12	13	2	--

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
T2-1	3	10	60	5	17	5	--	--
T2-2	5	6	58	12	14	5	--	--
T2-3	5	5	55	8	23	4	--	--
T2-1(C)	5	10	52	Tr	30	3	--	--

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
T2-1	26.9	3.4	14.3	32.9	3.2	8.9	2.6	1.6	6.1	--
T2-2	27.8	1.8	8.2	37.2	7.9	8.8	3.1	0.8	4.3	--
T2-3	39.1	3.5	6.4	29.4	4.2	12.0	2.1	0.6	1.9	--

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
T2-1	17.7	7.1	0.39
T2-2	17.4	4.1	0.33
T2-3	15.2	10.1	0.33

Tatum Site 3

Location: Culpeper County, Virginia; 200 ft. NNE from intersection of Rt. 619 and 683. 13,500 ft. E of Richardsville; 50 ft. E of logging road.
Elevation: 350 ft.

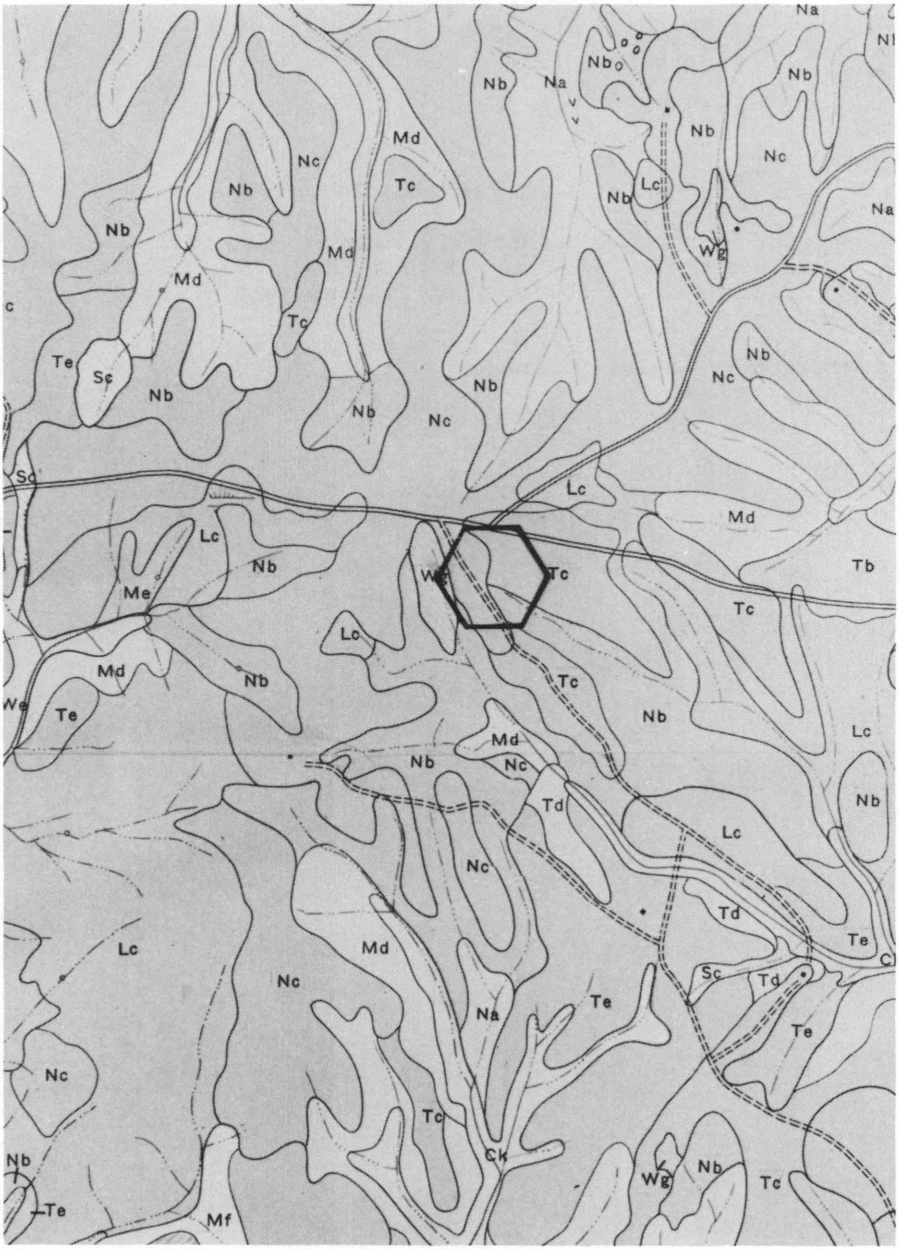
Vegetation: Loblolly pine cutover

Parent Material: Granite

Drainage: Well

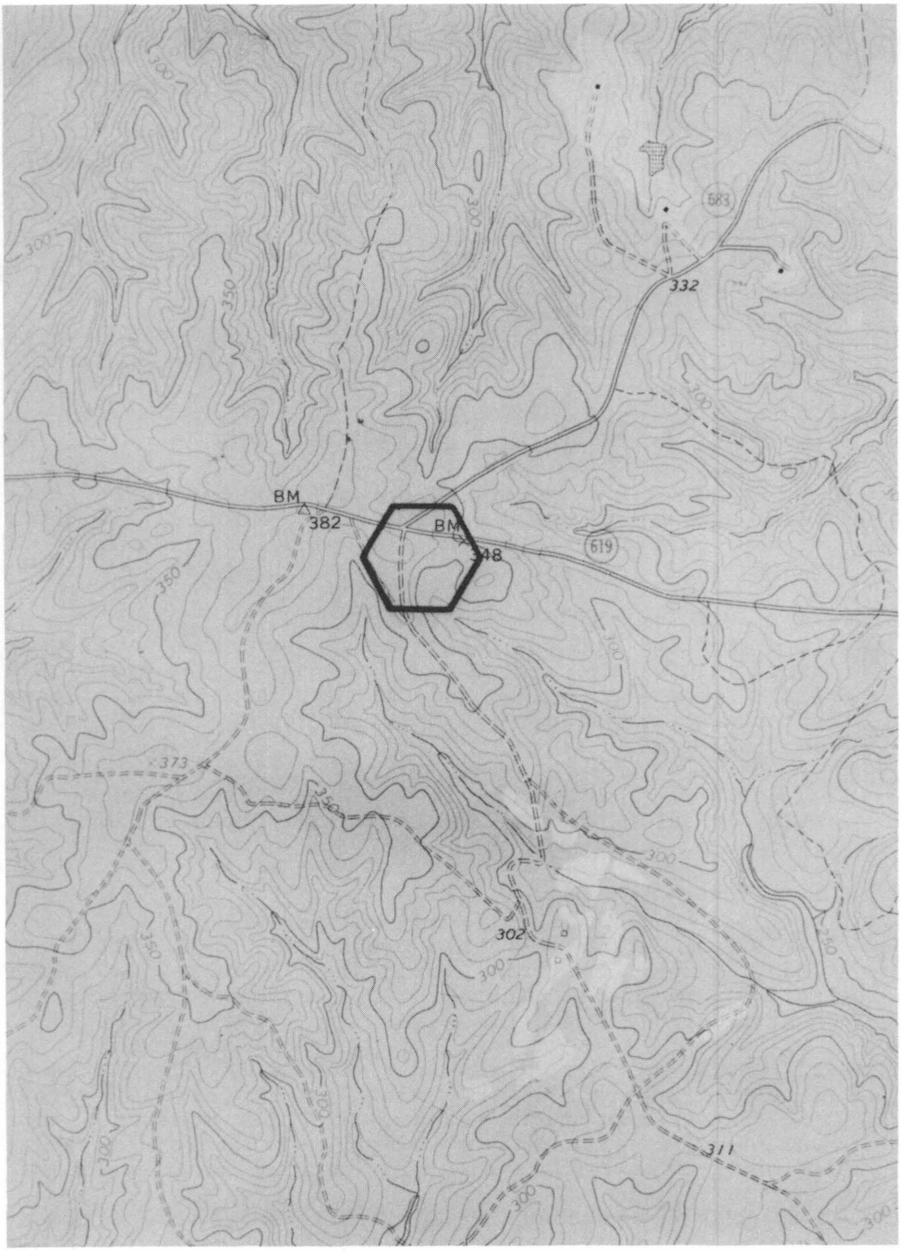
Classification: Typic Hapludult, clayey, kaolinitic, mesic

Trip Comments: The surface was gravelly. The soil sticky and plastic. Growth in this area was poor. Series concept was similar to Wedowe.



Tatum Site 3. Culpeper County soil survey.
Southeast map sheet. (1:24,000)

Tc = Tatum silt loam, 2-7% slopes
Nc = Nason silt loam, 2-7% slopes
Lc = Lignum silt loam, 0-14% slopes



Tatum Site 3. Culpeper County.
Topographic map (1:24,000)
Richardsville quadrangle.

PROFILE 1 (T3-1)

Ap--0 to 24 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 15% angular fragments of quartz.

B2t--24 to 60 cm, yellowish red (5YR 5/8) clay; common, fine, medium, and coarse, distinct mottles of yellowish brown (10YR 5/8), red (2.5YR 4/6), and light gray (10YR 7/2); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films.

C--60 to 150 cm, multicolored red, yellow, brown, and white silty clay; structureless massive; friable; slightly sticky, plastic.

PROFILE 2 (T3-2)

Ap--0 to 34 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 15% angular fragments of quartz.

B2t--34 to 80 cm, yellowish red (5YR 5/8) clay; common, fine, medium, and coarse, distinct mottles of yellowish brown (10YR 5/8), red (2.5YR 4/6), and light gray (10YR 7/2); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films.

C--80 to 150 cm, variegated red, yellow, brown, and white silty clay; structureless massive; friable, slightly sticky, slightly plastic.

PROFILE 3 (T3-3)

Ap--0 to 22 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 15% angular fragments of quartz.

B2t--22 to 70 cm, strong brown (7.5YR 5/8) clay; common, fine and medium, distinct mottles of yellowish brown (10YR 5/8) and light gray (10YR 7/2); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films.

C--70 to 150 cm, strong brown (7.5YR 5/8) clay; common, medium and coarse, distinct mottles of yellowish brown (10YR 5/8) and light gray (10YR 7/2); structureless massive; friable, slightly sticky, plastic.

Tatum Site 3

Hori-zon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				T3-1					
A	4.89	0.90	0.17	0.10	7.20	1.25	1.17	8.37	13.98
B	4.79	0.46	1.19	0.16	16.00	7.85	1.81	17.81	10.16
C	4.83	0.16	0.75	0.08	15.80	10.65	0.99	16.79	5.90
Co.Se.	4.55	0.10	0.31	0.08	12.60	8.45	0.49	13.09	3.74
				T3-2					
A	5.91	6.48	0.43	0.13	8.40	0.15	7.04	15.44	45.60
B	4.82	0.53	1.40	0.31	22.20	13.45	2.24	24.44	9.17
C	4.80	0.13	0.54	0.09	20.40	14.45	0.76	21.16	3.59
Co.Se.	4.86	0.14	0.33	0.09	15.40	10.55	0.56	15.96	3.51
				T3-3					
A	5.32	0.80	0.20	0.06	4.60	0.95	1.06	5.66	18.73
B	4.93	0.36	1.52	0.18	17.00	8.85	2.06	19.06	10.81
C	4.91	0.09	0.83	0.07	19.60	11.45	0.99	20.59	4.81
Co.Se.	4.91	0.14	0.46	0.10	18.20	10.75	0.70	18.90	3.70

Tatum Site 3

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Total	Silt	Clay	Textural Class
	percent								
				T3-1					
A	6.8	5.0	4.9	10.7	8.8	36.2	51.8	12.0	sil
Co.Se.	0.8	2.9	3.6	5.6	8.2	21.0	23.9	55.0	c
C	5.3	4.4	2.0	4.3	4.4	20.4	29.6	50.0	c
				T3-2					
A	2.9	5.9	6.7	13.0	6.9	35.4	57.7	6.9	sil
Co.Se.	0.5	1.0	1.8	5.4	8.8	17.7	22.0	60.3	c
C	0.4	0.9	0.7	1.1	5.1	8.3	47.0	44.7	sic
				T3-3					
A	5.1	4.9	4.8	11.9	9.5	36.2	57.7	6.0	sil
Co.Se.	0.2	0.6	1.3	2.9	4.1	9.1	25.8	65.1	c
C	3.3	3.2	1.5	3.6	3.2	14.8	16.5	68.7	c

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
T3-1	94	1	Tr	--	--	1	4
T3-2	94	1	--	--	--	3	2
T3-3	98	Tr	Tr	--	--	--	2
T3-1(C)	88	--	6	--	1	--	5

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
T3-1	67	5	--	8	20
T3-2	30	20	5	14	31
T3-3	33	17	5	17	28

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
T3-1	7	2	77	4	10	0.2	--	--
T3-2	3	3	80	9	5	0.1	--	--
T3-3	5	2	75	6	12	0.2	--	--
T3-1(C)	5	--	75	Tr	20	Tr	--	Tr

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
T3-1	39.6	1.4	1.1	44.3	7.0	5.5	0.1	0.2	0.8	--
T3-2	25.0	4.6	2.9	51.3	5.5	3.0	0.1	0.5	0.4	--
T3-3	20.7	4.4	2.6	53.2	11.1	7.8	0.1	--	0.2	--

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
T3-1	11.1	12.4	0.20
T3-2	16.0	13.8	0.27
T3-3	12.7	16.0	0.20

Tatum Site 4

Location: Culpeper County, Virginia, 100 ft. behind Oakland Church, off Rt. 610 near Richardsville.

Elevation: 355 ft.

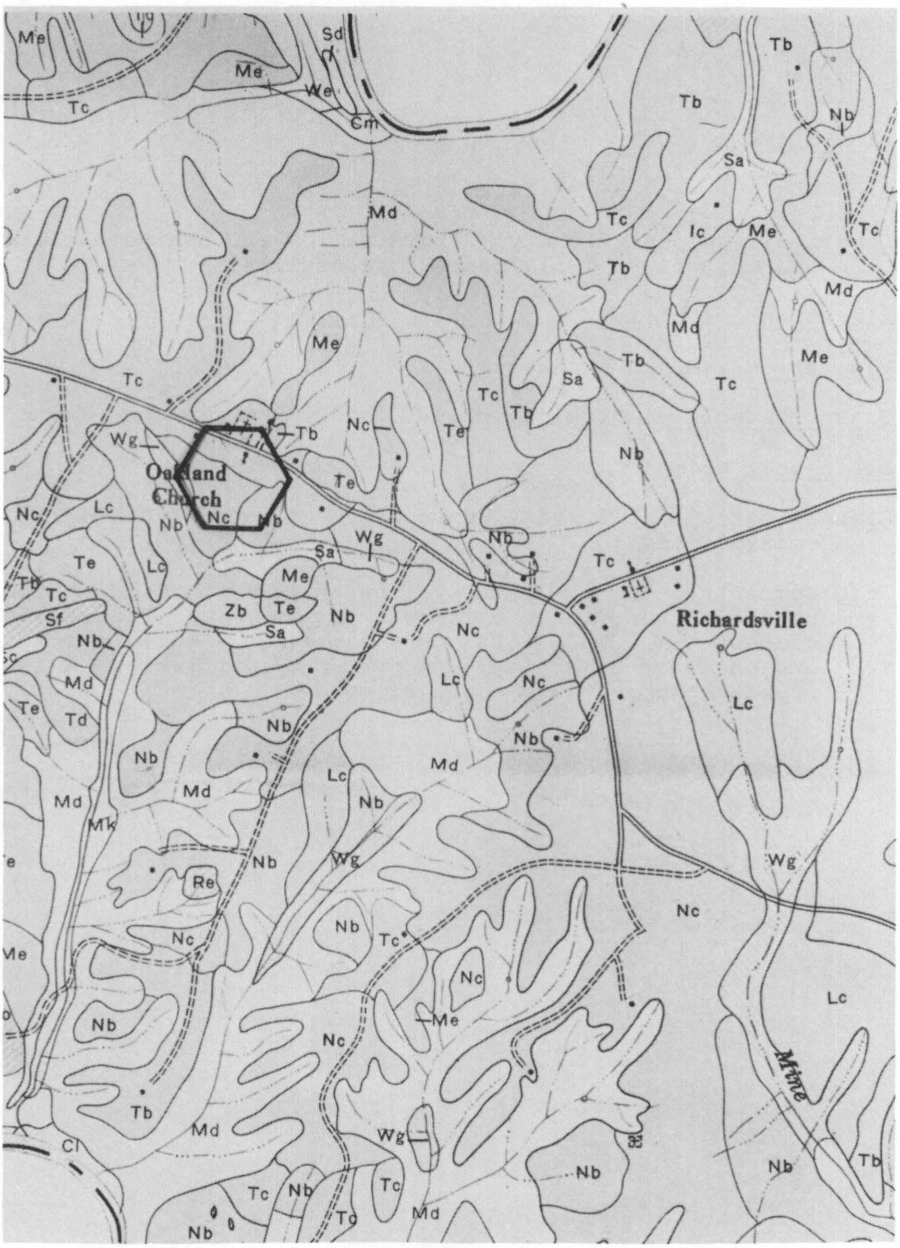
Vegetation: Mixed hardwoods

Parent Material: Mica schist

Drainage: Well

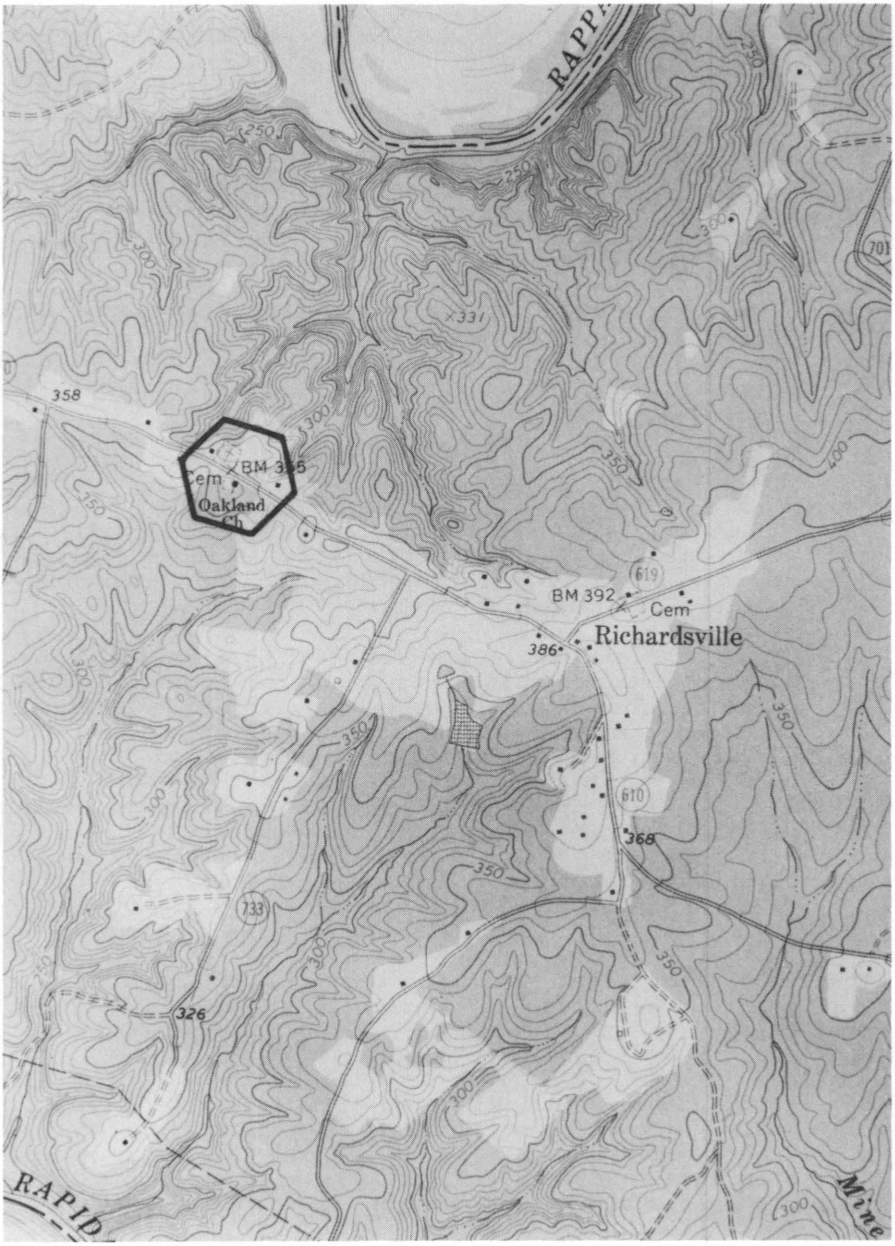
Classification: Typic Hapludult, clayey, kaolinitic (mixed), mesic

Trip Comments: The soil had yellowish brown colors in the upper B with quartz stringers throughout. The series concept was thought by some members to be Broakroad, though the overlay was not really identifiable. A few rounded pebbles were found as evidence.



Tatum Site 4. Culpeper County soil survey.
Southeast map sheet. (1:24,000)

Tc = Tatum silt loam, 2-7% slopes
Nc = Nason silt loam, 2-7% slopes
Md = Manteo shaly silt loam, 7-14% slopes



Tatum Site 4. Culpeper County.
Topographic map (1:24,000)
Richardsville quadrangle.

PROFILE 1 (T4-1)

Ap--0 to 30 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 20% angular fragments of quartz; few, fine mica flakes.

B2t--30 to 127 cm, red (2.5YR 4/6) clay; common, medium and coarse, distinct mottles of strong brown (7.5YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; common, fine mica flakes.

C--127 to 150 cm, red (2.5YR 4/8) silty clay loam; many, medium and coarse, distinct mottles of strong brown (7.5YR 5/8); structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 2 (T4-2)

Ap--0 to 20 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 20% angular fragments of quartz; few, fine mica flakes.

B2t--29 to 100 cm, yellowish red (5YR 5/8) clay; common, medium, distinct mottles of yellowish brown (10YR 5/6); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; common, fine mica flakes.

C--100 to 150 cm, red (2.5YR 4/6) loam; common, medium, distinct mottles of yellowish brown (10YR 5/6); structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 3 (T4-3)

Ap--0 to 35 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 15% angular fragments of quartz; few, fine mica flakes.

B2t--35 to 128 cm, yellowish red (5YR 4/6) clay; few, fine and medium distinct mottles of yellowish brown (10YR 5/6); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; common, fine mica flakes.

C--128 to 150 cm, variegated red, yellow, black, and white sandy clay loam; structureless massive; friable, slightly sticky, slightly plastic; many, common mica flakes.

Tatum Site 4

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				T4-1					
A	4.81	0.08	0.06	0.08	4.40	1.85	0.22	4.62	4.76
B	5.33	0.09	0.72	0.16	14.80	7.15	0.97	15.77	6.15
C	5.11	0.07	0.12	0.03	9.60	5.75	0.22	9.82	2.24
Co.Se.	4.96	0.10	0.08	0.08	10.20	4.95	0.26	10.46	2.49
				T4-2					
A	4.26	0.18	0.13	0.12	7.60	2.75	0.43	8.03	5.35
B	4.59	0.13	0.76	0.30	14.80	6.75	1.19	15.99	7.44
C	4.74	0.16	0.12	0.05	8.40	4.55	0.33	8.73	3.78
Co.Se.	5.27	0.10	0.09	0.11	11.20	5.65	0.30	11.50	2.61
				T4-3					
A	4.23	0.09	0.05	0.04	5.60	1.05	0.18	5.78	3.11
B	4.74	0.15	0.79	0.12	18.20	7.65	1.06	19.26	5.50
C	5.81	0.05	0.12	0.02	10.00	5.95	0.19	10.19	1.86
Co.Se.	5.20	0.07	0.10	0.10	10.60	5.90	0.27	10.87	2.48

Tatum Site 4

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Total	Silt	Clay	Textural Class
	percent								
				T4-1					
A	1.7	2.5	5.6	14.4	16.2	40.4	49.9	9.8	l-sil
Co.Se.	0.3	0.6	1.3	2.9	5.1	10.2	30.1	59.7	c
C	0.1	1.5	2.2	11.3	35.5	50.7	28.1	21.2	scl-l
				T4-2					
A	1.1	2.8	5.3	12.8	14.0	36.1	55.4	8.5	sil
Co.Se.	0.8	1.1	1.8	3.9	6.2	13.9	27.6	58.5	c
C	0.1	0.5	2.6	14.2	30.0	47.4	28.7	23.9	l
				T4-3					
A	1.5	2.8	5.4	13.0	16.3	39.0	54.4	6.6	sil
Co.Se.	2.5	2.9	2.4	3.2	4.7	15.5	20.1	64.4	c
C	2.6	4.2	3.9	11.8	26.1	48.5	26.5	25.0	scl

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
T4-1	98	1	Tr	--	Tr	1	--
T4-2	95	Tr	2	--	1	2	--
T4-3	98	Tr	Tr	--	Tr	1	1
T4-1(C)	67	1	27	Tr	--	3	2

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
T4-1	85	--	15	--	--
T4-2	63	--	32	5	--
T4-3	80	--	17	3	--

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
T4-1	5	12	50	10	16	1	6	--
T4-2	5	10	54	14	15	2	--	--
T4-3	3	8	61	9	16	1	2	--
T4-1(C)	Tr	10	56	19	10	Tr	5	--

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
T4-1	38.6	0.1	11.7	29.9	6.0	9.6	0.6	0.1	---	3.6
T4-2	33.5	---	15.0	33.0	8.2	8.8	1.2	0.3	---	---
T4-3	33.2	---	8.6	39.9	5.8	10.3	0.6	0.2	0.2	1.3

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
T4-1	16.0	7.0	0.28
T4-2	15.2	10.7	0.28
T4-3	16.0	9.2	0.26

Tatum Site 5

<u>Location</u>: Fauquier County, Virginia, 200 ft. NW of Rts. 651 and 632, near Embrey Church, 100 ft. W off Rt. 651.
<u>Elevation</u>: 370 ft.

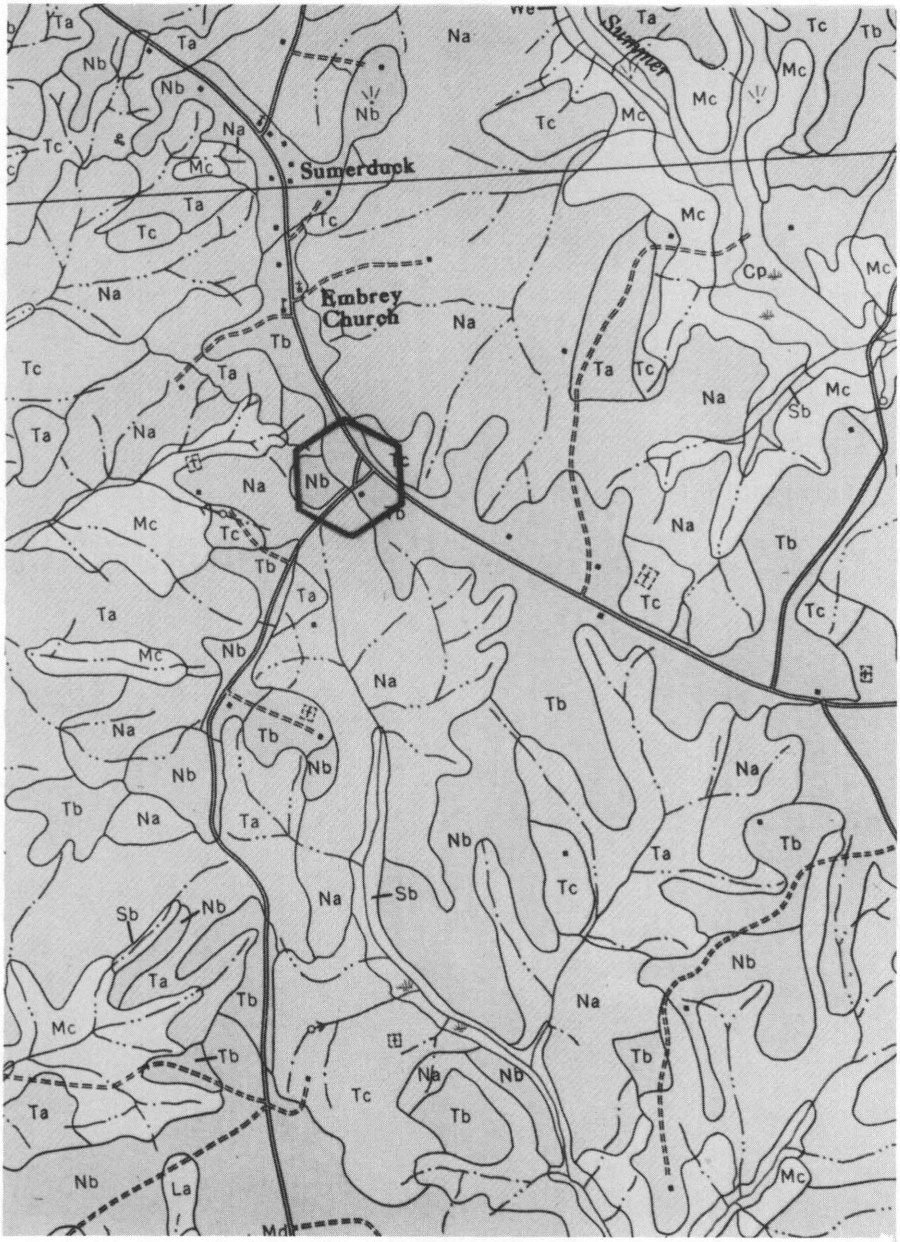
<u>Vegetation</u>: Pasture

<u>Parent Material</u>: Mica Schist

<u>Drainage</u>: Well

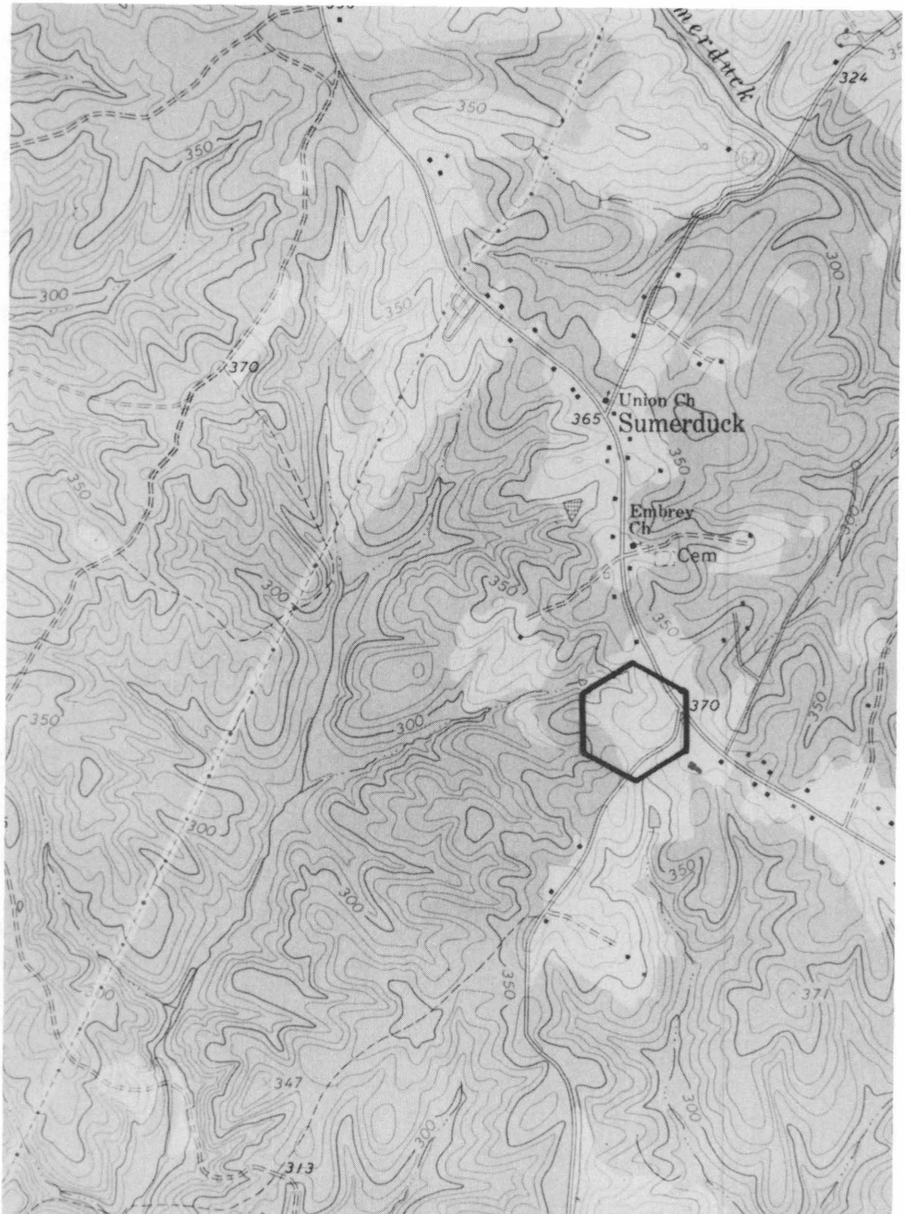
<u>Classification</u>: Typic Hapludult, clayey, kaolinitic, mesic

<u>Trip Comments</u>: The upper 4 feet looked the same as 90% of the sites. The soil appeared to be fairly fertile and was near the concepts of Cullen or Morrisville.



Tatum Site 5. Fauquier County soil survey.
Map sheet 17. (1:21,120)

Tb = Tatum silt loam, 2-7% slopes
Na = Nason silt loam, 2-7 % slopes
Tc = Tatum silty clay loam, 7-14% slopes, eroded



Tatum Site 5. Fauquier County.
Topographic map (1:24,000)
Richardsville quadrangle.

PROFILE 1 (T5-1)

Ap--0 to 25 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz; few, fine mica flakes.

B2t--25 to 115 cm, red (2.5YR 4/6) clay; common, fine and medium, distinct mottles of yellowish brown (10YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; common, fine mica flakes.

C--115 to 150 cm, variegated red, yellow, black, and white loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 2 (T5-2)

Ap--0 to 28 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz; common, fine mica flakes.

B2t--28 to 120 cm, red (2.5YR 4/6) silty clay; few, fine and medium, distinct mottles of yellowish brown (10YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; many, fine mica flakes.

C--120 to 161 cm, variegated red, yellow, black, and white loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 3 (T5-3)

Ap--0 to 28 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 2 to 5% angular fragments of quartz; common, fine mica flakes.

B2t--28 to 130 cm, red (2.5YR 4/8) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; many, fine mica flakes.

C--130 to 150 cm, variegated red, yellow, black, and white loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

Tatum Site 5

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				T5-1					
A	5.73	4.81	0.66	0.30	4.40	0.05	5.77	10.17	56.74
B	4.56	1.54	0.92	0.18	14.00	5.65	2.64	16.64	15.87
C	4.57	0.08	0.33	0.05	10.20	6.05	0.46	10.66	4.32
Co.Se.	5.04	0.10	0.36	0.17	12.20	6.85	0.63	12.83	4.91
				T5-2					
A	5.81	4.73	0.57	0.36	9.00	0.05	5.66	14.66	38.61
B	4.57	0.04	0.80	0.11	11.20	4.55	0.95	12.15	7.82
C	4.58	0.22	0.40	0.02	9.00	5.75	0.64	9.64	6.64
Co.Se.	4.98	0.08	0.33	0.07	8.20	3.45	0.48	8.68	5.53
				T5-3					
A	6.24	6.28	0.63	0.16	2.60	0.05	7.07	9.67	73.11
B	4.62	0.72	0.65	0.11	12.80	5.25	1.48	14.28	10.36
C	4.54	0.09	0.30	0.05	8.80	5.75	0.44	9.24	4.76
Co.Se.	5.15	0.09	0.25	0.08	9.00	4.95	0.42	9.42	4.46

Tatum Site 5

Horizon	Sand VC	C	M	F	VF	Total	Silt	Clay	Textural Class
				percent					
				T5-1					
A	1.2	3.8	4.9	9.8	13.3	33.0	49.4	17.6	l-sil
Co.Se.	1.6	1.6	1.5	2.8	3.9	11.4	35.3	53.2	c
C	0.1	0.2	0.2	4.3	39.9	44.6	38.6	16.8	l
				T5-2					
A	1.2	2.7	4.2	8.0	12.6	28.8	55.9	15.3	sil
Co.Se.	1.1	1.6	1.8	3.0	4.4	11.9	42.3	45.8	sic-c
C	0.8	3.2	2.6	6.5	25.2	38.3	47.7	14.0	l
				T5-3					
A	1.1	3.7	5.2	9.5	14.1	33.6	53.1	13.3	sil
Co.Se.	2.9	2.7	1.8	4.2	5.1	16.6	28.4	55.0	c
C	1.7	5.5	6.7	9.9	11.6	35.4	43.2	21.4	l

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
T5-1	97	1	Tr	--	--	2	--
T5-2	96	1	2	--	--	2	--
T5-3	98	1	Tr	--	Tr	1	--
T5-1(C)	31	--	26	Tr	--	13	30

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
T5-1	51	7	10	12	20
T5-2	37	--	49	14	--
T5-3	61	2	15	15	7

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
T5-1	3	5	62	15	15	0.1	--	--
T5-2	5	10	68	11	6	0.2	--	--
T5-3	5	10	60	15	10	0.2	--	--
T5-1(C)	5	10	65	15	10	---	--	--

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
T5-1	30.7	2.6	6.2	37.2	15.1	8.0	0.1	0.2	--	--
T5-2	29.4	0.1	25.5	37.0	5.0	2.7	0.1	0.2	--	--
T5-3	36.4	0.8	9.8	37.3	10.3	5.5	0.1	0.2	--	--

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
T5-1	14.4	10.6	0.27
T5-2	14.4	6.7	0.32
T5-3	13.8	8.4	0.25

Tatum Site 6

Location: Fauquier County, Virginia, 2900 ft. S of Silver Hill (Rts. 633 and 615); 50 ft. W. of Rt. 615.
Elevation: 406 ft.

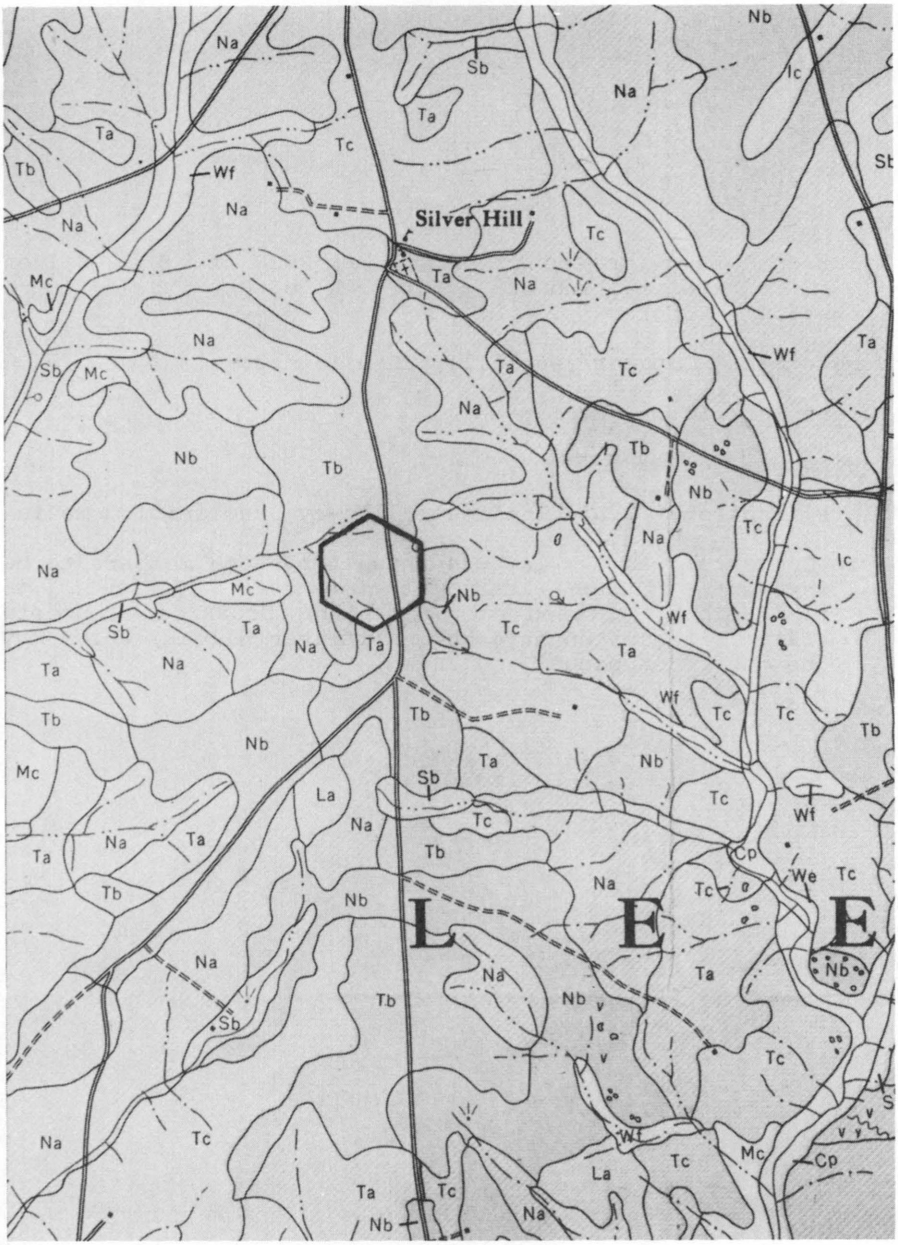
Vegetation: Cutover (Loblolly pine planted)

Parent Material: Overlay

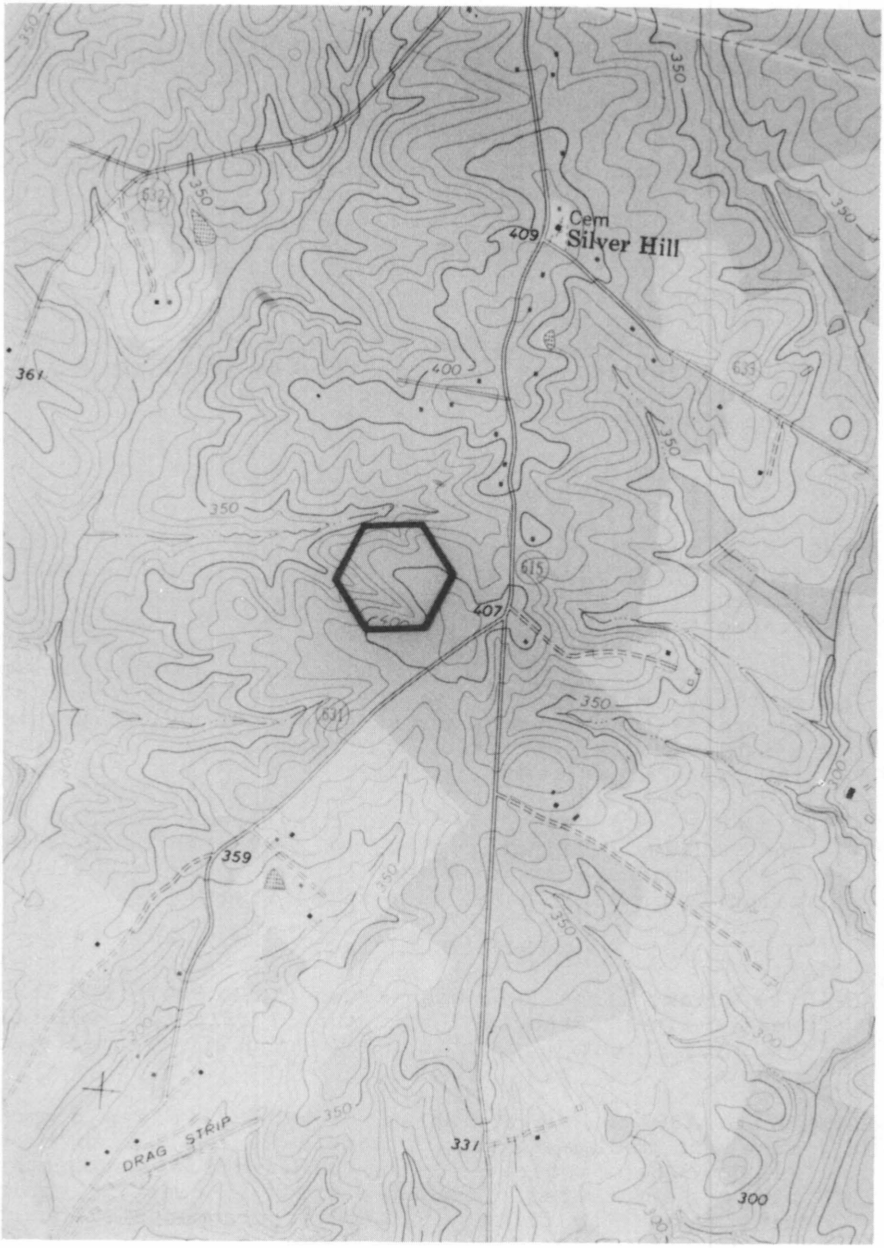
Drainage: Well

Classification: Typic Hapludult, clayey, kaolinitic, mesic

Trip Comments: An overlay was thought by some members to be present, though identification was difficult to impossible. Stated to be in the Broakroad concept. Tatum sites often have more silt than Elioak, which may be due to cappings.



Tatum Site 6. Fauquier County soil survey.
Map sheet 17. (1:21,120)
Tb = Tatum silt loam, 2-7% slopes
Ta = Tatum silt loam, 7-14% slopes
Na = Nason silt loam, 7-14% slopes



Tatum Site 6. Fauquier County.
Topographic map (1:24,000)
Richardsville quadrangle.

PROFILE 1 (T6-1)

Ap--0 to 18 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 15% subrounded quartz fragments.

B2t--18 to 130 cm, yellowish red (5YR 5/8) (upper) and red (2.5YR 4/6) (lower) clay; common, medium, distinct mottles of yellowish brown (10YR 6/8 and 10YR 5/4); moderate, fine and medium, subangular blocky structure; friable, sticky, plastic; thin, continuous clay films; few, fine mica flakes.

C--130 to 159 cm, variegated red, yellow, and black silt loam; structureless massive; friable, slightly sticky, slightly plastic; 30% fragments of schist; many, fine mica flakes.

PROFILE 2 (T6-2)

Ap--0 to 25 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 15% subrounded quartz fragments.

B2t--25 to 163 cm, red (2.5YR 4/6) clay; common, medium, distinct mottles of yellowish brown (10YR 5/8); moderate, fine and medium, subangular blocky structure; friable, sticky, plastic; thin, continuous clay films; few, fine mica flakes.

C--163 to 180 cm, red (2.5YR 4/6) clay loam; common, fine and medium, distinct mottles of yellowish brown (10YR 5/8); structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 3 (T6-3)

Ap--0 to 28 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 20% angular fragments of quartz.

B2t--28 to 138 cm, yellowish red (5YR 5/8) clay; common, fine and medium, distinct mottles of yellowish brown (10YR 5/8); moderate, fine and medium, subangular blocky structure; friable, sticky, plastic; thin, continuous clay films; 15% angular fragments of quartz in upper B2t; few, fine mica flakes.

C--138 to 169 cm, variegated red, yellow, and black clay; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

Tatum Site 6

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
T6-1									
A	4.45	0.20	0.07	0.06	7.80	2.45	0.33	8.13	4.06
B	4.85	0.11	0.85	0.21	16.00	5.10	1.17	17.17	6.81
C	4.78	0.07	0.19	0.01	8.80	3.55	0.27	9.07	2.98
Co.Se.	5.36	0.09	0.27	0.05	14.40	4.75	0.41	14.81	2.77
T6-2									
A	4.48	0.07	0.04	0.07	6.60	1.85	0.18	6.78	2.65
B	4.82	0.13	0.98	0.24	14.40	4.85	1.35	15.75	8.57
C	4.44	0.05	0.27	0.02	11.00	4.95	0.34	11.34	3.00
Co.Se.	5.61	0.10	0.35	0.09	13.80	4.95	0.54	14.34	3.77
T6-3									
A	4.24	0.14	0.10	0.21	7.80	3.05	0.45	8.25	5.45
B	4.82	0.12	0.79	0.20	15.60	5.45	1.11	16.71	6.64
C	4.86	0.10	0.32	0.01	12.40	5.55	0.43	12.83	3.35
Co.Se.	5.46	0.09	0.32	0.09	15.00	4.65	0.50	15.50	3.23

Tatum Site 6

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Total	Silt	Clay	Textural Class
	percent								
T6-1									
A	2.0	2.1	3.5	8.0	9.1	24.7	55.0	20.3	sil
Co.Se.	0.8	1.4	2.0	4.8	6.0	15.1	21.8	63.1	c
C	0.5	1.1	1.0	5.0	21.3	28.8	49.7	21.5	l-sil
T6-2									
A	1.3	2.1	4.1	8.3	10.5	26.4	57.1	16.5	sil
Co.Se.	0.8	1.1	1.7	3.9	4.8	12.4	21.2	66.4	c
C	0.2	1.4	3.8	7.6	14.4	27.4	31.8	40.7	c-cl
T6-3									
A	0.9	2.2	3.8	7.9	9.6	24.4	75.0	0.6	sil
Co.Se.	0.8	1.6	2.6	6.1	6.4	17.6	25.0	57.5	c
C	2.8	3.6	3.0	6.9	12.5	28.8	24.0	47.2	c

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
T6-1	96	1	--	--	1	1	1
T6-2	97	1	Tr	--	1	1	--
T6-3	97	1	Tr	Tr	1	1	--
T6-1(C)	41	--	52	--	--	3	4

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
T6-1	81	3	14	2	--
T6-2	80	3	14	3	--
T6-3	85	4	10	1	--

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
T6-1	5	1	58	13	20	3	--	--
T6-2	5	3	53	15	22	2	--	--
T6-3	5	5	53	12	22	2	1	--
T6-1(C)	Tr	10	76	7	7	--	--	Tr

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
T6-1	35.4	0.9	3.7	37.0	8.2	12.6	1.9	0.2	0.2	---
T6-2	32.3	0.7	5.0	35.8	10.0	14.6	1.3	0.1	---	---
T6-3	41.3	1.2	5.4	30.8	6.9	12.7	1.2	0.2	---	0.6

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
T6-1	15.5	11.5	0.28
T6-2	16.0	10.7	0.26
T6-3	14.4	11.8	0.27

Tatum Site 7

Location: Fluvanna County, Virginia, across the road from Antioch Church, Rt. 637.

Elevation: 510 ft.

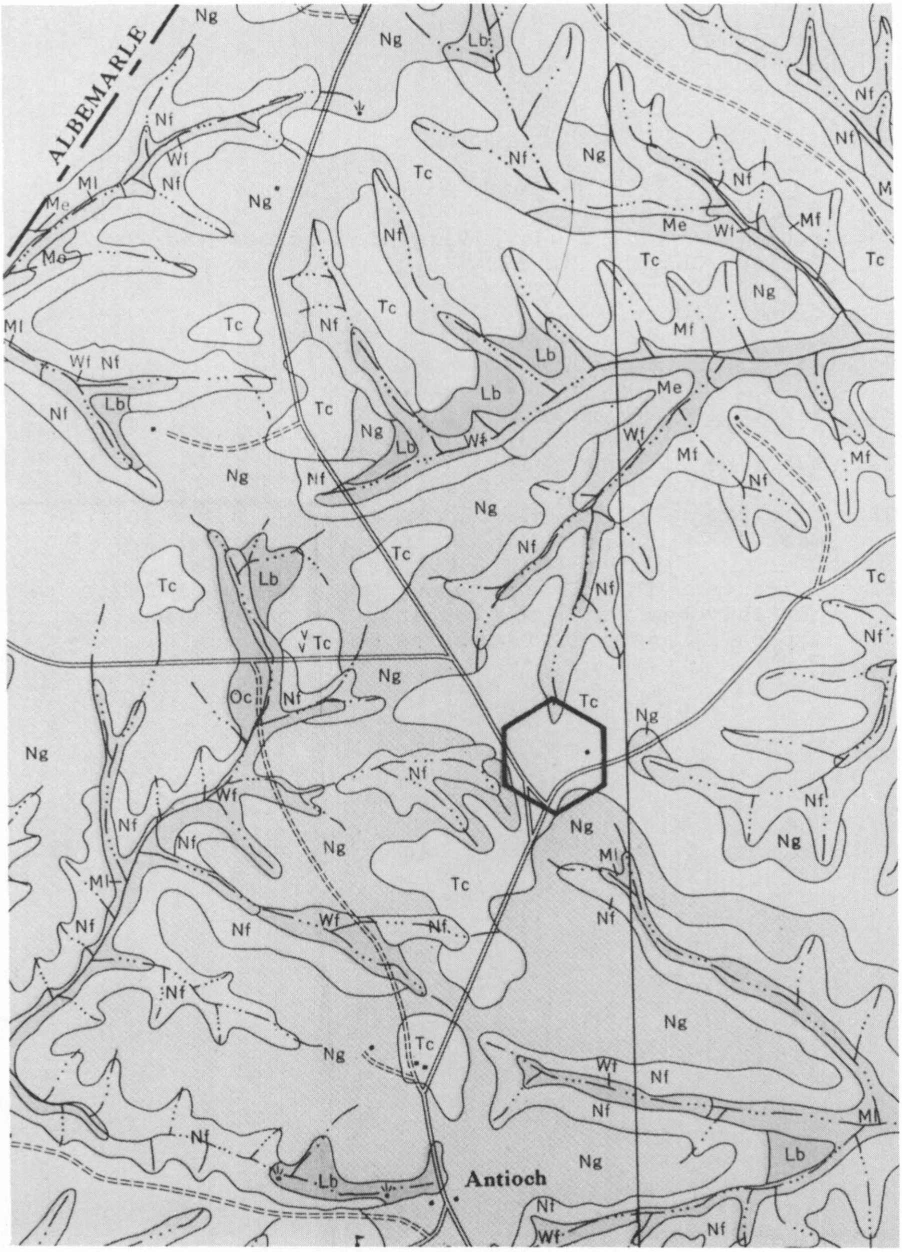
Vegetation: Hardwoods

Parent Material: Mica schist

Drainage: Well

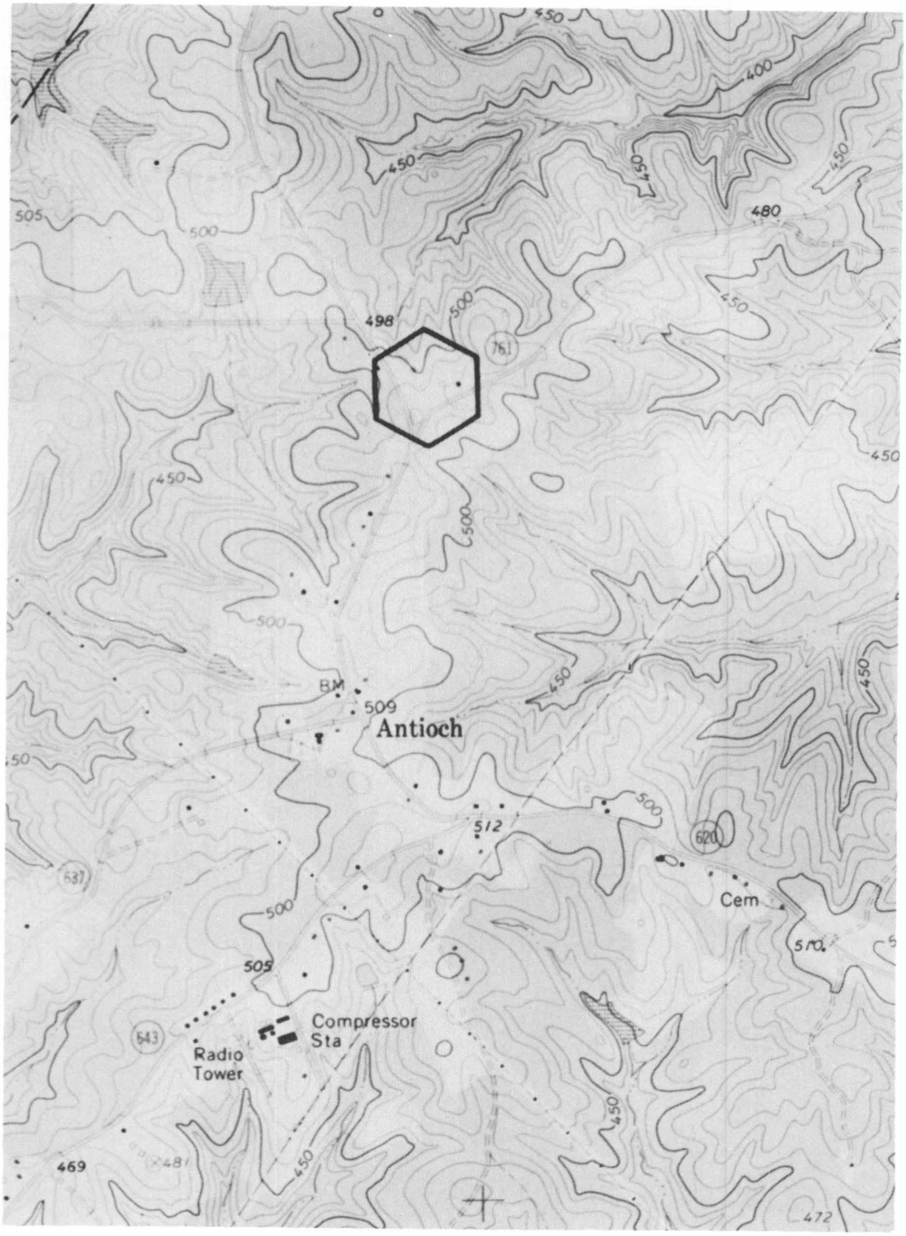
Classification: Typic Hapludult, clayey, mixed (oxidic), mesic

Trip Comments: This is very near the concept of Tatum. It possibly has a shallow capping. The geology was what is typically associated with the Tatum series.

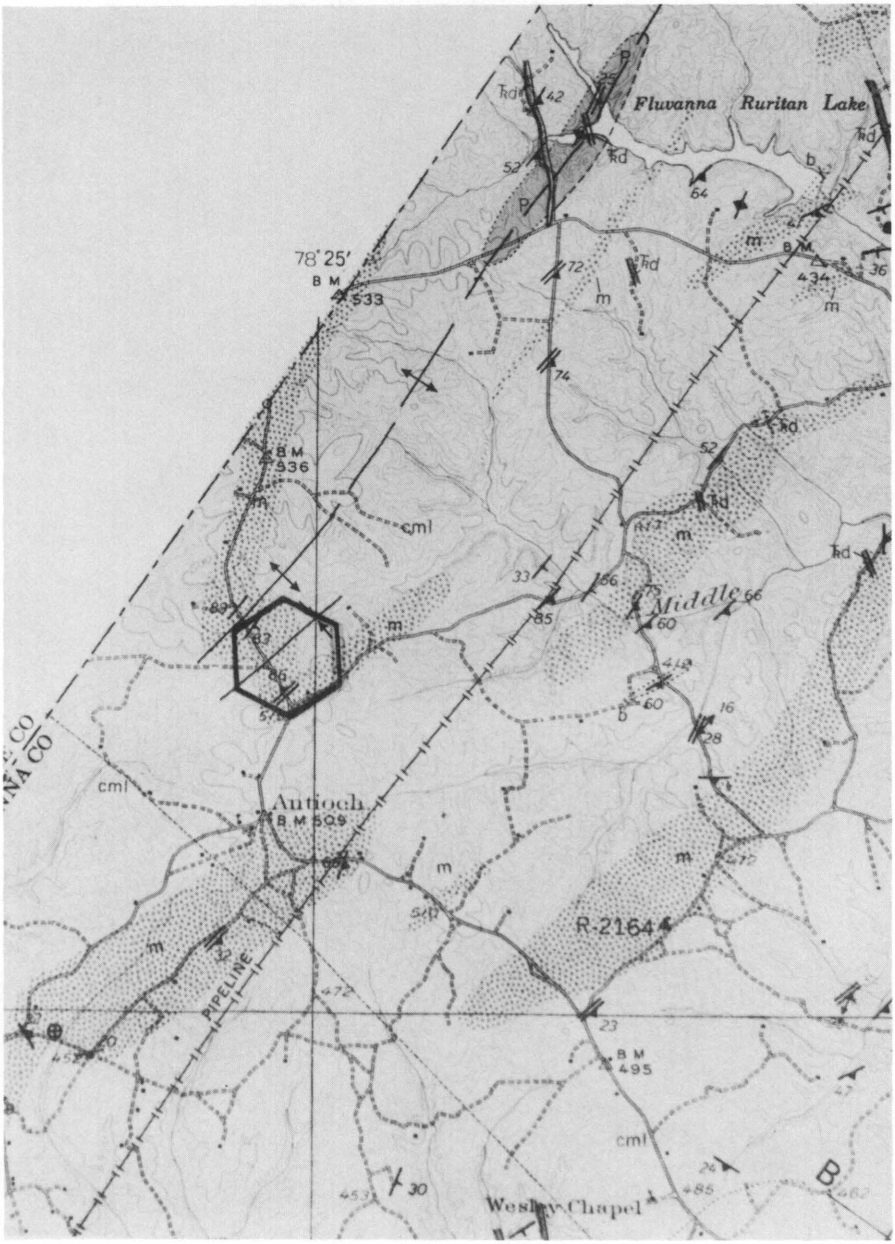


<u>Tatum</u> <u>Site</u> <u>7</u>. <u>Fluvanna</u> <u>County</u> <u>soil</u> <u>survey</u>.
<u>Map</u> <u>sheet</u> <u>3</u>. (<u>1</u>:<u>15</u>,<u>840</u>)

Tc = Tatum silt loam, 2-8% slopes
Ng = Nason silt loam, 2-8% slopes
Nf = Nason silt loam, 8-15% slopes
Mf = Manteo silt loam, 8-15% slopes



Tatum Site 7. Fluvanna County.
Topographic map (1:24,000)
Scottsville quadrangle.



Tatum Site 7. Fluvanna County Geologic Map.
(1:62,500)

cml = lower chlorite-muscovite unit of Evington Group
cmu = upper chlorite-muscovite unit, phyllite, metamorphosed greywacke of Evington Group
m = muscovite rock and muscovite rich residuum of Evington Group

PROFILE 1 (T7-1)

Ap--0 to 38 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10 to 15% angular fragments of quartz.

B2t--38 to 144 cm, yellowish red (5YR 5/6) clay; common, fine and medium, distinct mottles of strong brown (7.5YR 5/6); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; 10% to 15% angular fragments of quartz; few, fine mica flakes.

C--144 to 161 cm, variegated red, yellow, brown, white, and green loam; structureless massive; friable, slightly sticky, nonplastic; many, fine mica flakes.

PROFILE 2 (T7-2)

Ap--0 to 30 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz.

B2t--30 to 140 cm, yellowish red (5YR 4/6) clay; common, medium and coarse, distinct mottles of yellowish brown (10YR 5/6); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; 5% angular fragments of quartz; few, fine mica flakes.

C--140 to 173 cm, variegated red, yellow, black, white, and green loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 3 (T7-3)

Ap--0 to 26 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine granular structure; friable, slightly sticky, slightly plastic; 5 to 10% angular fragments of quartz.

B2t--26 to 156 cm, yellowish red (5YR 5/6) clay; common, fine, distinct mottles of yellowish brown (10YR 5/6); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; 5% angular fragments of quartz; few, fine mica flakes.

C--156 to 183 cm, variegated red, yellow, brown, white, and green loam; structureless massive; friable, slightly sticky, slightly plastic, 5% angular fragments of quartz; many, fine mica flakes.

Tatum Site 7

Hori-zon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				T7-1					
A	4.30	0.11	0.07	0.19	7.60	1.95	0.37	7.97	4.64
B	4.72	0.10	0.73	0.46	13.20	5.45	1.29	14.49	8.90
C	4.66	0.08	0.08	0.03	5.60	2.85	0.19	5.79	3.28
Co.Se.	5.20	0.10	0.09	0.10	12.60	4.05	0.29	12.89	2.25
				T7-2					
A	4.36	0.16	0.09	0.26	9.40	2.65	0.51	9.91	5.15
B	4.78	0.10	0.29	0.21	16.80	6.05	0.60	17.40	3.45
C	4.65	0.07	0.11	0.04	10.40	4.85	0.22	10.62	2.07
Co.Se.	5.33	0.09	0.08	0.10	13.00	3.85	0.27	13.27	2.03
				T7-3					
A	4.45	0.11	0.08	0.22	7.20	2.35	0.41	7.61	5.39
B	4.84	0.12	0.48	0.33	16.60	6.35	0.93	17.53	5.31
C	4.66	0.07	0.10	0.01	9.20	4.15	0.18	9.38	1.92
Co.Se.	5.24	0.08	0.13	0.17	16.80	5.65	0.38	17.18	2.21

Tatum Site 7

Horizon	Sand								Textural Class
	VC	C	M	F	VF	Total	Silt	Clay	
	percent								
				T7-1					
A	2.4	3.7	4.2	7.2	10.2	27.8	58.8	13.4	sil
Co.Se.	1.2	1.4	1.1	1.7	2.5	8.0	22.8	69.2	c
C	1.4	3.3	5.7	14.3	23.8	48.5	38.2	13.3	l
				T7-2					
A	2.1	3.5	3.9	7.2	9.8	26.6	62.1	11.4	sil
Co.Se.	1.2	1.5	1.3	2.6	4.0	10.6	22.3	67.0	c
C	3.3	6.3	3.4	4.1	7.3	24.5	44.6	30.9	cl
				T7-3					
A	2.5	3.5	3.8	6.7	8.1	24.6	54.7	20.6	sil
Co.Se.	0.8	1.2	1.0	1.7	2.5	7.3	17.4	75.3	c
C	7.1	12.7	6.6	5.1	6.8	38.2	40.9	20.8	l

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
T7-1	97	Tr	--	Tr	1	1	1
T7-2	96	1	--	--	2	1	--
T7-3	89	1	Tr	--	1	1	8
T7-1(C)	25	--	2	Tr	1	Tr	72

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
T7-1	49	18	28	5	2
T7-2	77	6	15	2	--
T7-3	55	12	27	6	--

Clay Mineralogy

Pro-file	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
T7-1	3	14	42	15	23	3	--	--
T7-2	3	5	37	24	27	4	--	--
T7-3	3	10	41	20	22	4	--	--
T7-1(C)	Tr	30	45	25	Tr	Tr	--	--

Whole Soil Mineralogy

Pro-file	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
T7-1	21.1	4.1	16.1	30.2	10.9	15.9	2.1	0.1	0.1	---
T7-2	29.4	1.5	6.7	25.2	16.1	18.1	2.7	0.1	---	---
T7-3	18.4	2.2	12.2	31.9	15.1	16.6	3.0	0.1	0.6	---

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
T7-1	18.0	9.9	0.29
T7-2	15.8	9.5	0.28
T7-3	18.0	13.8	0.28

Tatum Site 8

Location: Fluvanna County, Virginia; 200 ft. NE of Union Mills Church.
Elevation: 416 ft.

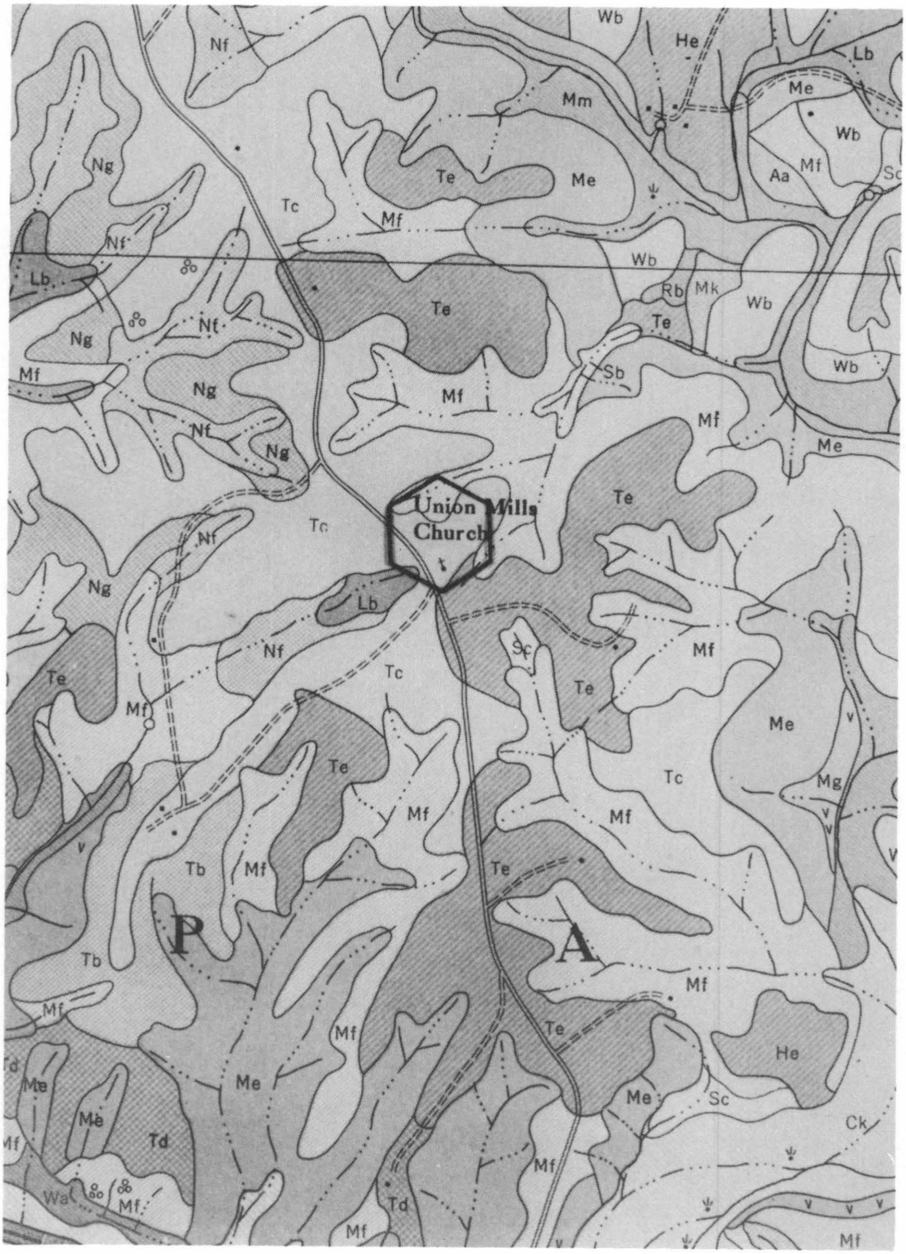
Vegetation: Mixed hardwoods and pines

Parent Material: Mica schist

Drainage: Well

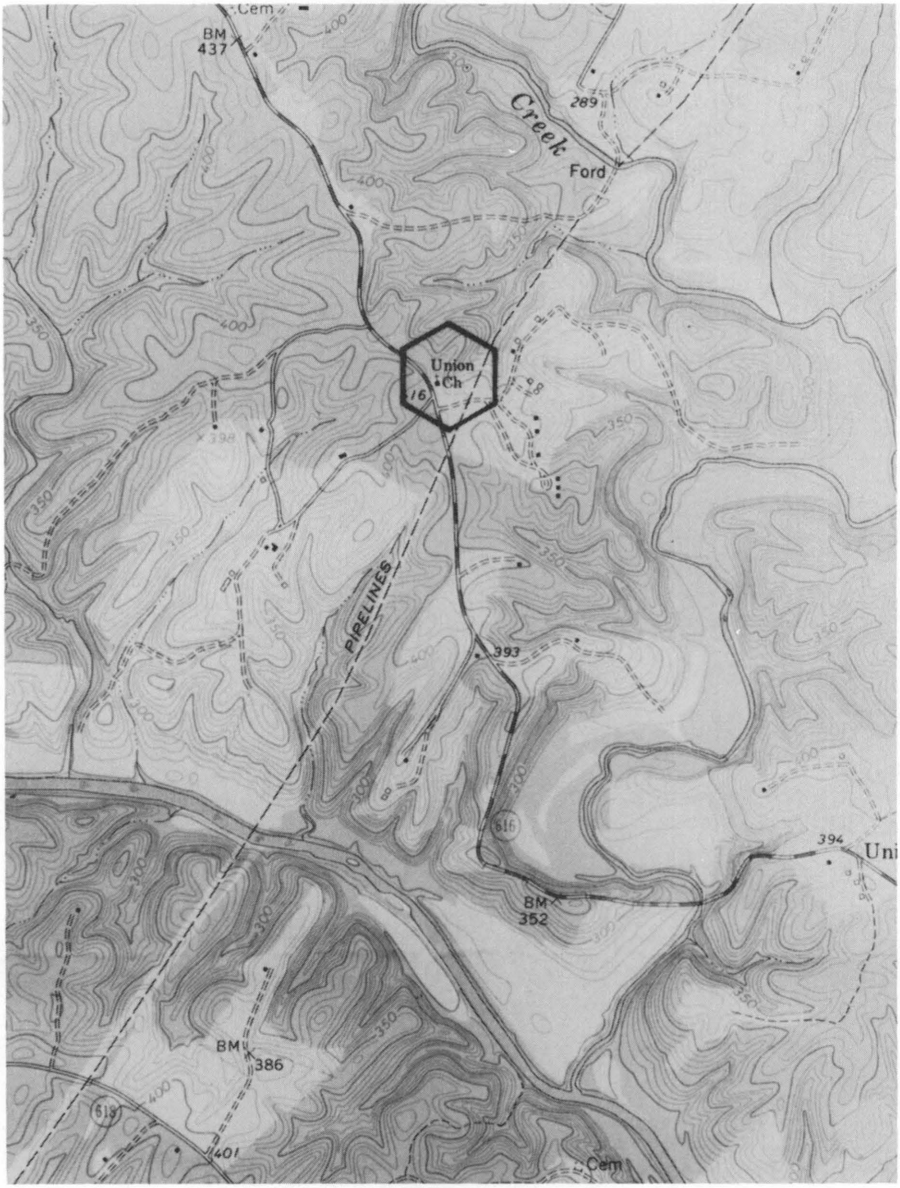
Classification: Typic Hapludult, clayey, oxidic, mesic

Trip Comments: Site location and ferrougonous quartzite pebbles suggest a capping, though it appeared similar to the Tatum concept (not as close as Site 7).

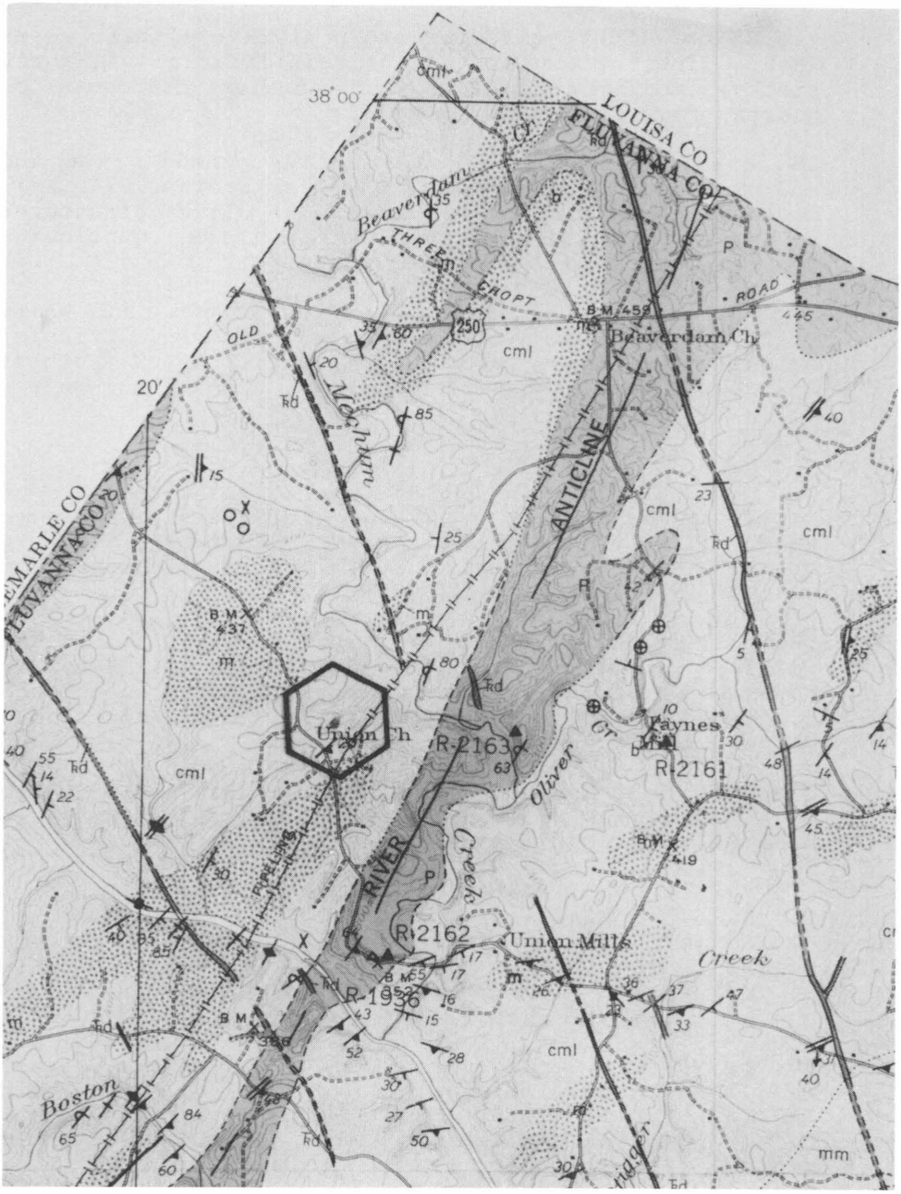


<u>Tatum</u> <u>Site</u> <u>8</u>. <u>Fluvanna</u> <u>County</u> <u>soil</u> <u>survey</u>.
<u>Map</u> <u>Sheet</u> <u>2</u>. (<u>1</u>:<u>15</u>,<u>840</u>)

Tc = Tatum silt loam, 2-8% slopes
Te = Tatum silty clay loam, eroded, 2-8% slopes
Mf = Manteo silt loam, 8-15% slopes
Nf = Nason silt loam, 8-15% slopes



Tatum Site 8. Fluvanna County.
Topographic map (1:24,000)
Boyd Tavern quadrangle.



Tatum Site 8. Fluvanna County Geologic Map. (1:62,500)

cml = lower chlorite-muscovite unit of Evington Group

m = muscovite rock and muscovite rich residuum of Evington Group

p = paragonite unit of Evington Group

mm = middle muscovite unit, phyllite, and metamorphosed greywacke of Evington Group

PROFILE 1 (T8-1)

Ap--0 to 28 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz; few, fine mica flakes.

B2t--28 to 97 cm, red (2.5YR 4/6) clay; common, fine and medium, distinct mottles of yellowish brown (10YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; common, fine mica flakes.

C--97 to 150 cm, variegated red, yellow, brown, and white silty clay loam; structureless massive; friable, slightly sticky, slightly plastic; 10% schist fragments; many, fine mica flakes.

PROFILE 2 (T8-2)

Ap--0 to 20 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular framents of quartz; few, fine mica flakes.

B2t--20 to 110 cm, red (2.5YR 4/6) clay; common, medium and coarse, distinct mottles of yellowish brown (10YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; common, fine mica flakes.

C--110 to 150 cm, variegated red, yellow, brown, and white clay loam; structureless massive; friable, slightly sticky, slightly plastic; few, fine mica flakes.

PROFILE 3 (T8-3)

Ap--0 to 26 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 15% angular fragments of quartz; few, fine mica flakes.

B2t--26 to 79 cm, red (2.5YR 4/6) clay; common, fine, medium, and coarse, distinct mottles of yellowish brown (10YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thick, continuous clay films; common, fine mica flakes.

C--79 to 150 cm, variegated red, yellow, brown, and white loam; structureless massive; friable, slightly sticky, slightly plastic; 5% schist fragments; many, common mica flakes.

Tatum Site 8

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				T8-1					
A	4.30	0.14	0.10	0.25	14.80	3.55	0.49	15.29	3.20
B	4.98	0.16	0.81	0.47	15.40	5.25	1.44	16.84	8.55
C	4.75	0.10	0.20	0.02	14.40	6.55	0.32	14.72	2.17
Co.Se.	5.35	0.08	0.11	0.10	11.80	4.55	0.29	12.09	2.40
				T8-2					
A	4.12	0.17	0.09	0.15	15.40	4.15	0.41	15.80	2.59
B	4.92	0.09	0.62	0.21	19.40	6.55	0.92	20.32	4.53
C	4.75	0.10	0.21	0.05	16.00	7.75	0.36	16.36	2.20
Co.Se.	5.47	0.11	0.19	0.10	17.60	7.85	0.40	18.00	2.22
				T8-3					
A	4.00	0.11	0.10	0.14	18.40	4.75	0.35	18.75	1.87
B	4.92	0.14	0.85	0.46	17.60	4.95	1.45	19.05	7.61
C	4.92	0.10	0.16	0.09	9.80	4.25	0.35	10.15	3.45
Co.Se.	5.35	0.09	0.04	0.10	4.80	2.05	0.23	5.03	4.57

Tatum Site 8

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Sand Total	Silt	Clay	Textural Class
	percent								
				T8-1					
A	3.0	3.2	3.1	6.9	14.4	30.6	52.5	16.8	sil
Co.Se.	1.1	1.2	1.4	3.2	5.3	12.3	24.1	63.6	c
C	0.7	1.5	1.7	5.3	7.7	16.9	47.6	35.6	sicl
				T8-2					
A	1.4	3.1	3.3	7.8	10.8	26.3	50.7	23.0	sil
Co.Se.	1.2	2.1	1.8	3.1	6.1	14.3	18.9	66.9	c
C	2.1	5.1	3.8	5.3	12.6	28.9	34.3	36.8	cl
				T8-3					
A	3.7	2.6	3.6	8.0	12.2	30.1	53.0	16.9	sil
Co.Se.	0.9	1.9	2.0	3.8	7.3	16.0	16.6	67.5	c
C	3.4	9.4	6.2	7.4	16.6	43.1	32.2	24.7	l

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
T8-1	84	2	Tr	--	--	4	10
T8-2	77	--	--	--	1	9	13
T8-3	75	--	--	Tr	Tr	4	21
T8-1(C)	76	--	Tr	--	--	7	17

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
T8-1	62	18	12	6	5
T8-2	52	17	25	6	--
T8-3	51	11	25	6	7

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
T8-1	3	5	54	11	22	5	--	--
T8-2	3	10	46	15	21	5	--	--
T8-3	3	5	45	13	28	6	--	--
T8-1(C)	Tr	5	74	Tr	20	1	--	--

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
T8-1	27.1	4.5	6.1	35.7	8.2	14.0	3.2	0.5	1.2	--
T8-2	22.8	3.2	11.4	31.9	10.0	14.0	3.3	1.3	1.9	--
T8-3	22.5	1.8	7.6	31.4	10.0	18.9	4.1	0.6	3.4	--

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
T8-1	19.6	9.7	0.36
T8-2	21.3	15.4	0.37
T8-3	19.3	3.8	0.35

Tatum Site 9

Location: Louisa County, Virginia, 850 ft. S of Boswells Tavern on E side of Rt. 15, 175 ft. from road.
Elevation: 490 ft.

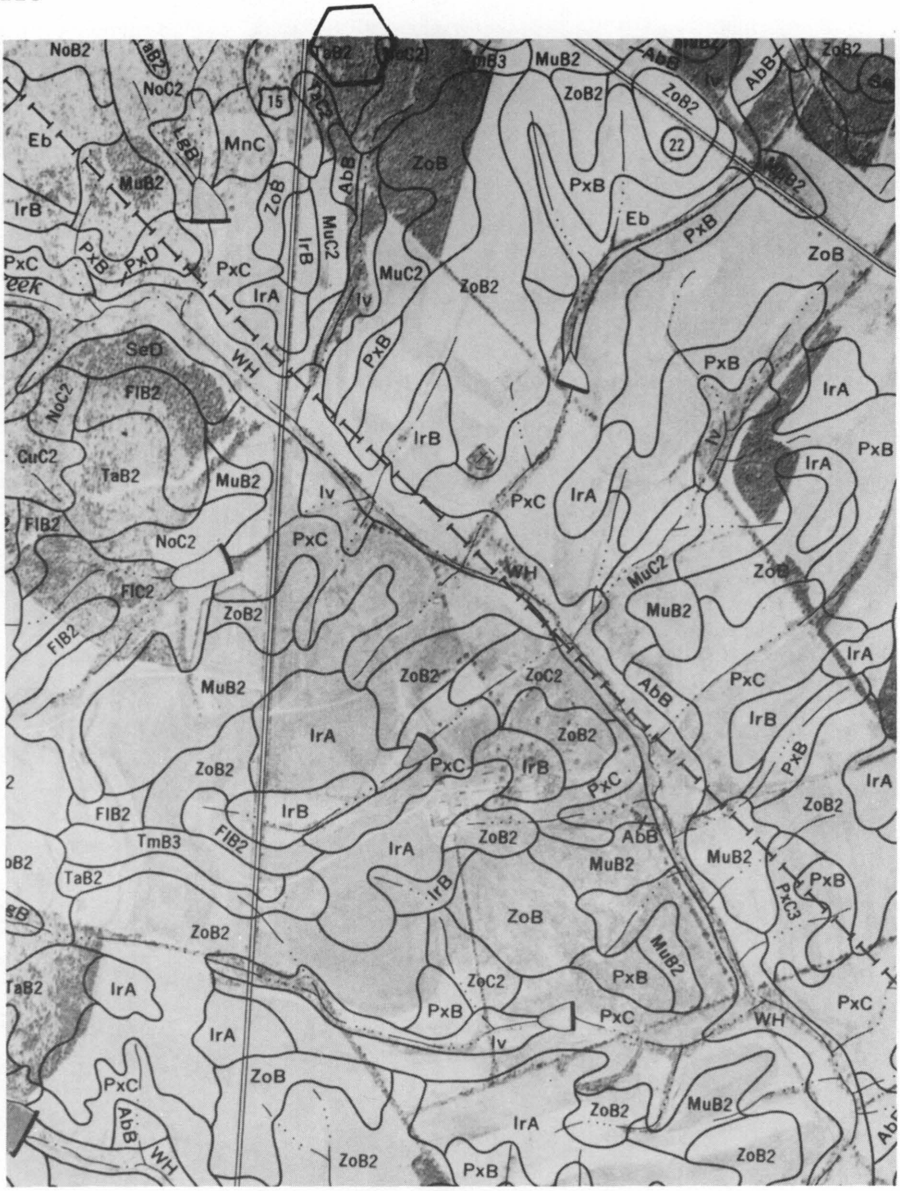
Vegetation: Mixed hardwoods and pines

Parent Material: Mica schist or gneiss

Drainage: Well

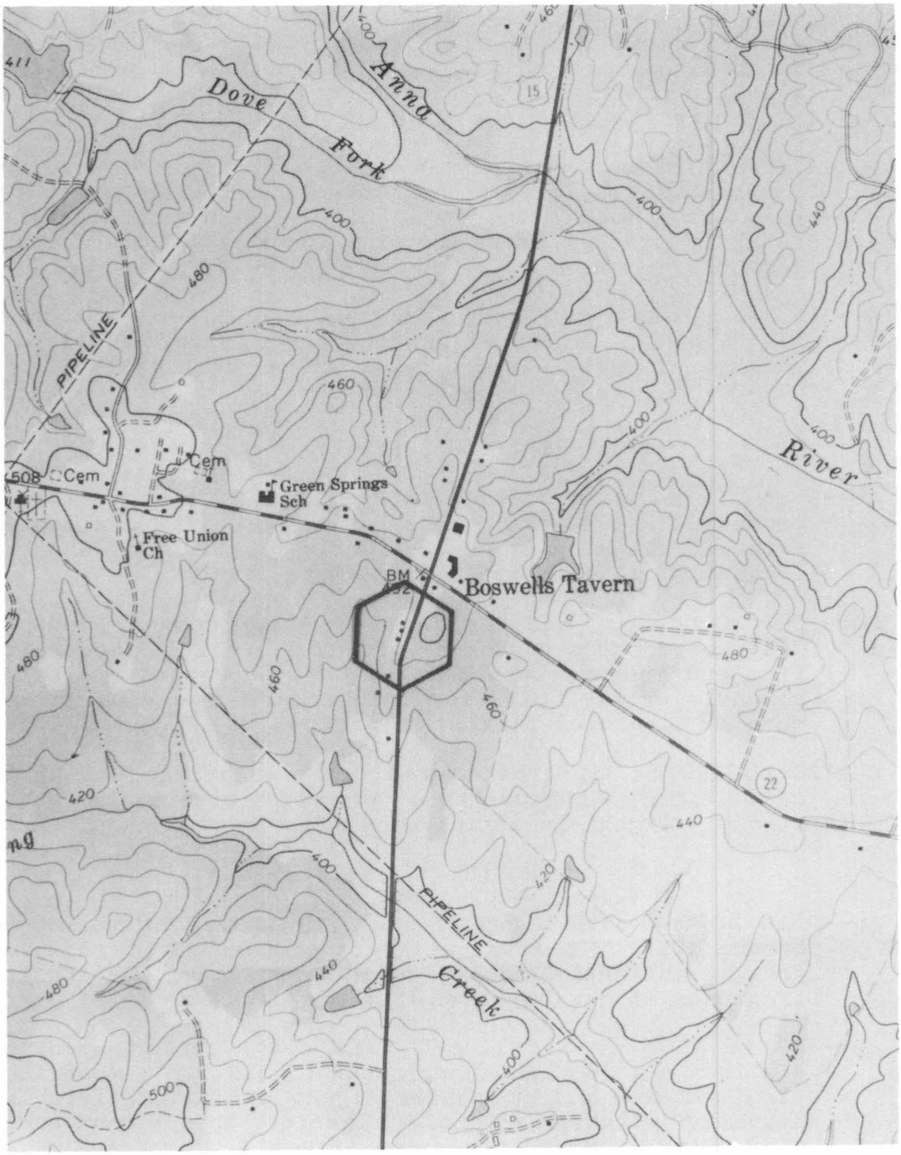
Classification: Typic Hapludult, clayey, kaolinitic, mesic

Trip Comments: This site had hard rock at 42 inches. The upper part looked similar to many of the other profiles, though it was thought by some members to be Catharpin due to rounded pebbles at 18 to 24 inches.



Tatum Site 9. Louisa County soil survey.
Map sheet 15. (1:15,840)

TaB2 = Tatum silt loam, 2-7% slopes, eroded
TaC2 = Tatum silt loam, 7-15% slopes, eroded
NoC2 = Nason silt loam, 7-15% slopes, eroded
LgB = Lignum loam, 2-7% slopes



Tatum Site 9. Louisa County.
Topographic map (1:24,000)
Boswells Tavern quadrangle.

PROFILE 1 (T9-1)

Ap--0 to 25 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz; few, fine mica flakes.

B2t--25 to 125 cm, red (2.5YR 4/6) clay; common, medium, distinct mottles of strong brown (7.5YR 5/6); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; common, fine mica flakes.

C--125 to 160 cm, variegated red, yellow, black, and white silt loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 2 (T9-2)

Ap--0 to 20 cm, dark brown (7.5YR 3/2) and light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 15% angular fragments of quartz; few, fine mica flakes.

B2t--20 to 120 cm, red (2.5YR 4/6) clay; common, medium, distinct mottles of strong brown (7.5YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; common, fine mica flakes.

C--120 to 150 cm, variegated red, yellow, brown, and white clay loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 3 (T9-3)

Ap--0 to 20 cm, dark brown (7.5YR 3/2) and light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz; few, fine mica flakes.

B2t--20 to 130 cm, red (2.5YR 4/6) clay; common, medium, distinct mottles of strong brown (7.5YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thin, continuous clay films; common, fine mica flakes.

C--130 to 155 cm, variegated red, yellow, black, and white clay loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

Tatum Site 9

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				T9-1					
A	4.76	0.76	0.19	0.10	7.60	1.35	1.05	8.65	12.14
B	5.32	0.11	0.50	0.14	17.20	6.65	0.75	17.95	4.18
C	5.12	0.06	0.13	0.09	12.00	7.65	0.28	12.28	2.28
Co.Se.	5.66	0.30	0.43	0.11	17.60	7.25	0.84	18.44	4.56
				T9-2					
A	5.44	3.78	0.54	0.13	7.40	0.15	4.45	11.85	37.55
B	5.18	0.78	0.98	0.15	15.60	5.15	1.91	17.51	10.91
C	5.20	0.09	0.18	0.05	13.20	6.75	0.32	13.52	2.37
Co.Se.	5.80	0.19	0.26	0.09	13.40	6.15	0.54	13.94	3.87
				T9-3					
A	5.23	2.87	0.52	0.25	7.80	0.35	3.64	11.44	31.82
B	4.90	0.69	0.71	0.16	15.60	5.45	1.56	17.16	9.09
C	4.84	0.06	0.17	0.13	12.80	6.15	0.36	13.16	2.74
Co.Se.	5.70	0.17	0.22	0.08	14.80	6.25	0.47	15.27	3.08

Tatum Site 9

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Sand Total	Silt	Clay	Textural Class
	percent								
				T9-1					
A	1.9	4.1	6.3	11.4	13.2	37.0	48.4	14.6	l
Co.Se.	0.5	1.3	1.7	4.9	6.4	14.9	16.3	68.8	c
C	1.9	5.5	7.8	14.9	20.1	50.2	27.2	22.6	scl-l
				T9-2					
A	1.2	4.0	6.3	11.2	12.7	35.5	47.1	17.4	l
Co.Se.	0.7	1.7	2.3	4.1	7.5	16.3	18.1	65.5	c
C	1.9	4.2	4.3	8.1	16.4	34.9	28.0	37.1	cl
				T9-3					
A	2.0	4.3	7.0	11.3	13.4	38.0	46.9	15.2	l
Co.Se.	0.9	1.4	2.1	3.3	5.7	13.5	15.1	71.4	c
C	1.4	3.8	4.1	8.8	16.1	34.2	25.3	40.5	c-cl

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	----	----	----	percent	----	----	----
T9-1	96	--	2	--	1	Tr	1
T9-2	97	1	--	--	--	1	1
T9-3	98	Tr	--	--	1	Tr	1
T9-1(C)	87	--	10	--	--	Tr	3

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	----	----	percent	----	----
T9-1	68	--	25	2	5
T9-2	75	2	10	8	5
T9-3	80	3	6	6	5

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	----	----	----	----	percent	----	----	----
T9-1	4	3	68	4	17	3	1	--
T9-2	5	2	70	5	15	3	--	--
T9-3	7	2	61	6	21	3	--	--
T9-1(C)	Tr	Tr	65	5	30	Tr	--	Tr

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	----	----	----	----	percent	----	----	----	----	----
T9-1	28.2	---	6.5	47.1	3.6	11.7	2.1	---	0.1	0.7
T9-2	32.7	0.6	3.1	47.3	4.2	9.8	2.1	0.2	0.2	---
T9-3	30.3	0.5	2.3	44.5	5.1	15.0	2.1	---	0.1	---

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
T9-1	17.1	14.8	0.28
T9-2	16.0	11.0	0.28
T9-3	16.6	12.1	0.26

Tatum Site 10

Location: Louisa County, Virginia, 5000 ft. NNE of Mineral on Rt. 222, 475 ft. SE of Rt. 522.
Elevation: 450 ft.

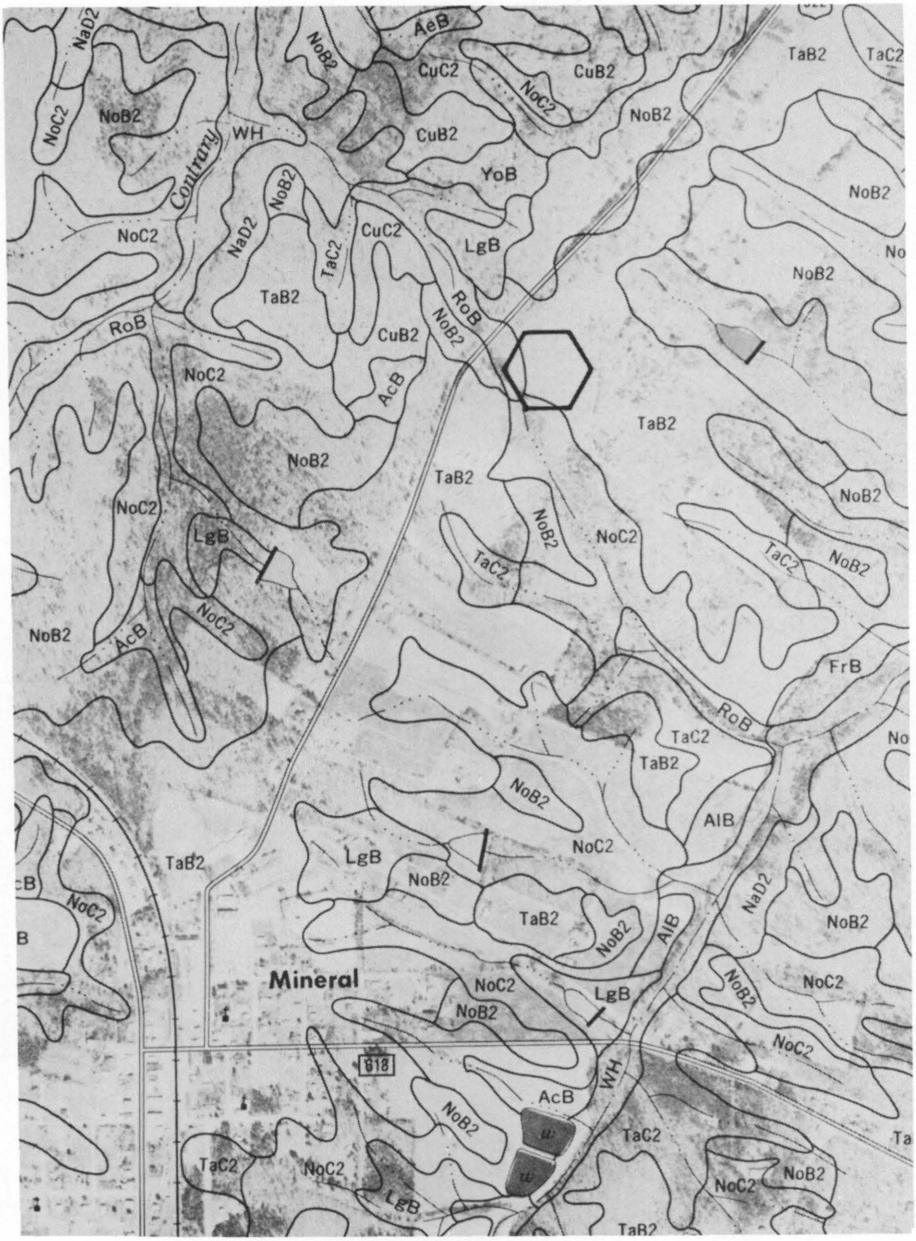
Vegetation: Mixed hardwoods and pines

Parent Material: Too deep to know (overlay)

Drainage: Well

Classification: Typic Hapludult, clayey, oxidic, mesic

Trip Comments: It was agreed by everyone that this site had a significant overlay, identifiable by rounded quartzite pebbles and the firmer consistance than what is typically associated with Tatum.



Tatum Site 10. Louisa County soil survey.
Map sheet 27. (1:15,840)
TaB2 = Tatum silt loam, 2-7% slopes, eroded
TaC2 = Tatum silt loam, 7-15% slopes, eroded
NoC2 = Nason silt loam, 7-15% slopes, eroded
LgB = Lignum loam, 2-7% slopes

Tatum Site 10. Louisa County.
Topographic map (1:24,000)
Mineral quadrangle.

PROFILE 1 (T10-1)

Ap--0 to 25 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, nonplastic; 10% angular fragments of quartz, few, fine mica flakes.

B2t--25 to 178 cm, red (2.5YR 4/6) clay; fine, medium, distinct mottles of strong brown (7.5YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; few, fine mica flakes.

C--178+ cm, red (2.5YR 4/6) clay; fine, medium, distinct mottles of strong brown (7.5YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; common, fine mica flakes.

PROFILE 2 (T10-2)

Ap--0 to 23 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, nonplastic; 5 to 10% angular fragments of quartz; few, fine mica flakes.

B2t--23 to 180 cm, red (2.5YR 4/8) clay; common, medium, distinct mottles of strong brown (7.5YR 5/6); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; 2 to 5% angular fragments of quartz; common, fine mica flakes.

C--180+ cm, red (2.5YR 4/8) silt loam; common, medium, distinct mottles of strong brown (7.5YR 5/6); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; common, fine mica flakes.

PROFILE 3 (T10-3)

Ap--0 to 21 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz; few, common mica flakes.

B2t--21 to 180 cm, red (2.5YR 4/6) clay, common, fine and medium, distinct mottles of strong brown (7.5YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; 10% angular fragments of quartz; common, fine mica flakes.

C--180+ cm, red (2.5YR 4/6) silt loam; common, fine and medium, distinct mottles of strong brown (7.5YR 5/8); moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; 5% angular fragments of quartz; common, fine mica flakes.

Tatum Site 10

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
					T10-1				
A	4.02	0.03	0.07	0.13	7.00	1.65	0.23	7.23	3.18
B	4.42	0.07	0.49	0.12	10.60	3.25	0.68	11.28	6.03
C	4.46	0.03	0.18	0.04	9.80	3.05	0.25	10.05	2.49
Co.Se.	5.68	0.09	0.22	0.05	10.80	2.75	0.36	11.16	3.23
					T10-2				
A	4.16	0.04	0.07	0.14	8.20	1.75	0.25	8.45	2.96
B	4.66	0.06	0.86	0.16	13.40	3.35	1.08	14.48	7.46
C	4.83	0.03	0.25	0.05	10.80	2.75	0.33	11.13	2.96
Co.Se.	5.80	0.09	0.27	0.09	10.40	2.95	0.45	10.85	4.15
					T10-3				
A	4.35	0.05	0.08	0.09	8.40	1.85	0.22	8.62	2.55
B	4.91	0.06	0.54	0.09	11.40	3.45	0.69	12.09	5.71
C	4.98	0.04	0.18	0.04	9.80	2.75	0.26	10.06	2.58
Co.Se.	5.55	0.08	0.28	0.08	11.20	2.85	0.44	11.64	3.78

Tatum Site 10

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Sand Total	Silt	Clay	Textural Class
	percent								
				T10-1					
A	1.3	2.9	4.1	11.3	18.7	38.3	49.1	12.5	l
Co.Se.	0.4	1.7	2.5	6.0	13.2	23.9	23.7	52.5	c
C	0.2	1.2	1.8	4.0	14.4	21.6	31.6	46.8	c
				T10-2					
A	1.6	2.9	4.1	10.5	18.4	37.5	48.3	14.1	l
Co.Se.	0.8	1.8	2.3	6.7	11.8	23.5	23.1	53.4	c
C	0.5	1.1	1.3	3.5	10.9	17.3	24.9	57.8	c
				T10-3					
A	1.5	3.1	3.8	9.9	18.2	36.6	48.2	15.2	l
Co.Se.	0.4	1.9	2.3	5.3	11.9	21.8	21.8	56.3	c
C	0.7	1.9	2.6	5.5	11.0	21.7	32.3	46.0	c

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	------	------	------	percent	------	------	------
T10-1	87	2	Tr	--	9	1	1
T10-2	89	Tr	--	--	10	Tr	1
T10-3	84	Tr	--	--	14	2	--
T10-1(C)	84	--	1	--	9	2	4

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	------	------	percent	------	------
T10-1	93	2	5	--	--
T10-2	91	2	5	2	--
T10-3	62	18	15	5	--

Clay Mineralogy

Pro-file	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	------	------	------	------	percent	------	------	------
T10-1	7	5	54	7	21	6	--	--
T10-2	6	5	54	6	23	6	--	--
T10-3	6	5	59	5	20	5	--	--
T10-1(C)	Tr	Tr	70	5	25	--	--	--

Whole Soil Mineralogy

Pro-file	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	------	------	------	------	percent	------	------	------	------	------
T10-1	46.5	1.0	3.8	28.4	3.7	11.0	3.2	0.2	0.2	---
T10-2	45.1	0.5	3.9	29.3	3.2	12.3	3.2	---	0.2	---
T10-3	35.2	3.9	6.1	34.3	2.8	11.3	2.8	0.4	---	---

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
T10-1	13.5	8.1	0.32
T10-2	13.8	7.9	0.32
T10-3	14.4	8.9	0.31

Elioak Site 1

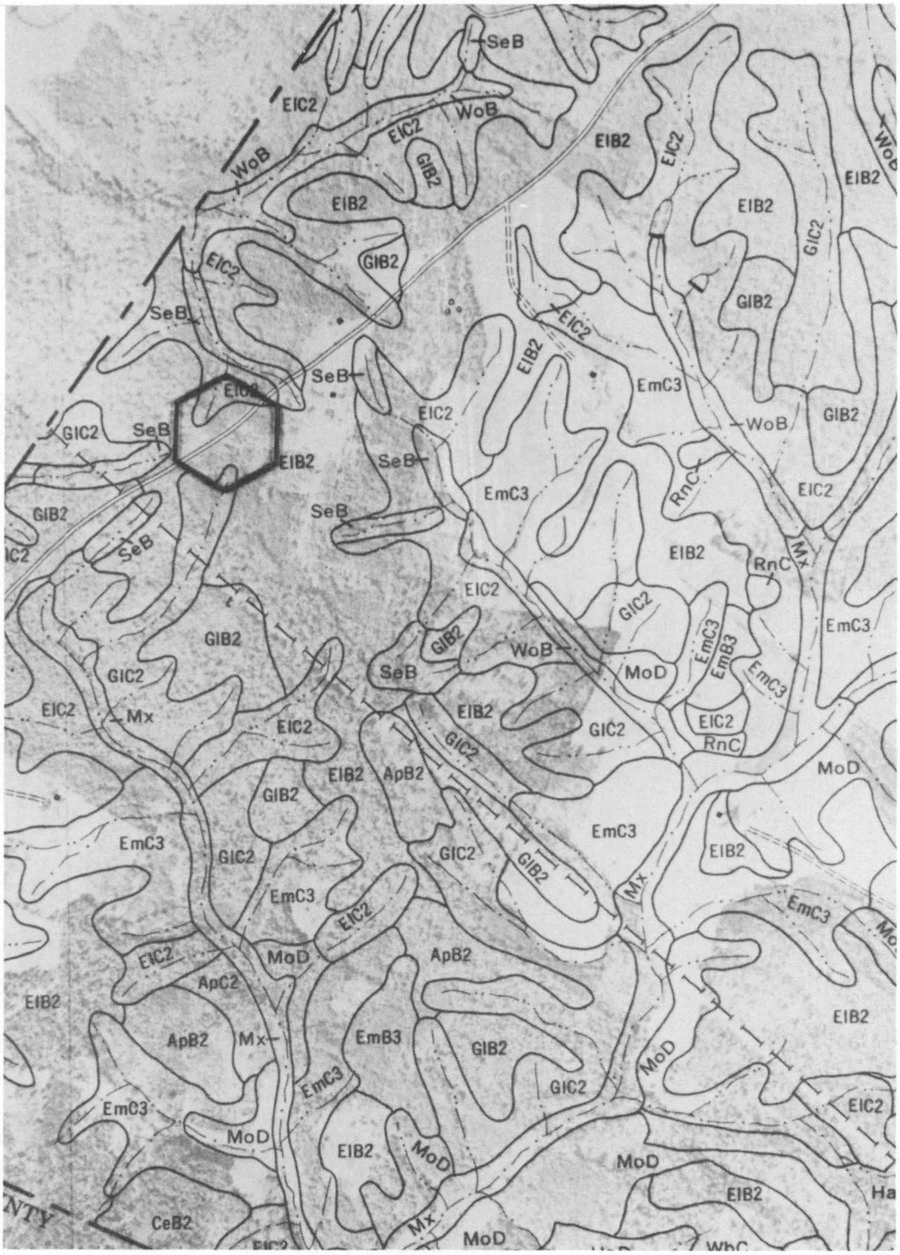
Location: Orange County, Virginia, 8000 ft. SW of Rts. 607 and 33, 900 ft. NE of pipeline, 50 ft. E of highway.
Elevation: 560 ft.

Vegetation: Virginia pines and mixed oaks

Parent Material: Phyllites and mica schist (Lynchburg Formation)
Drainage: Well

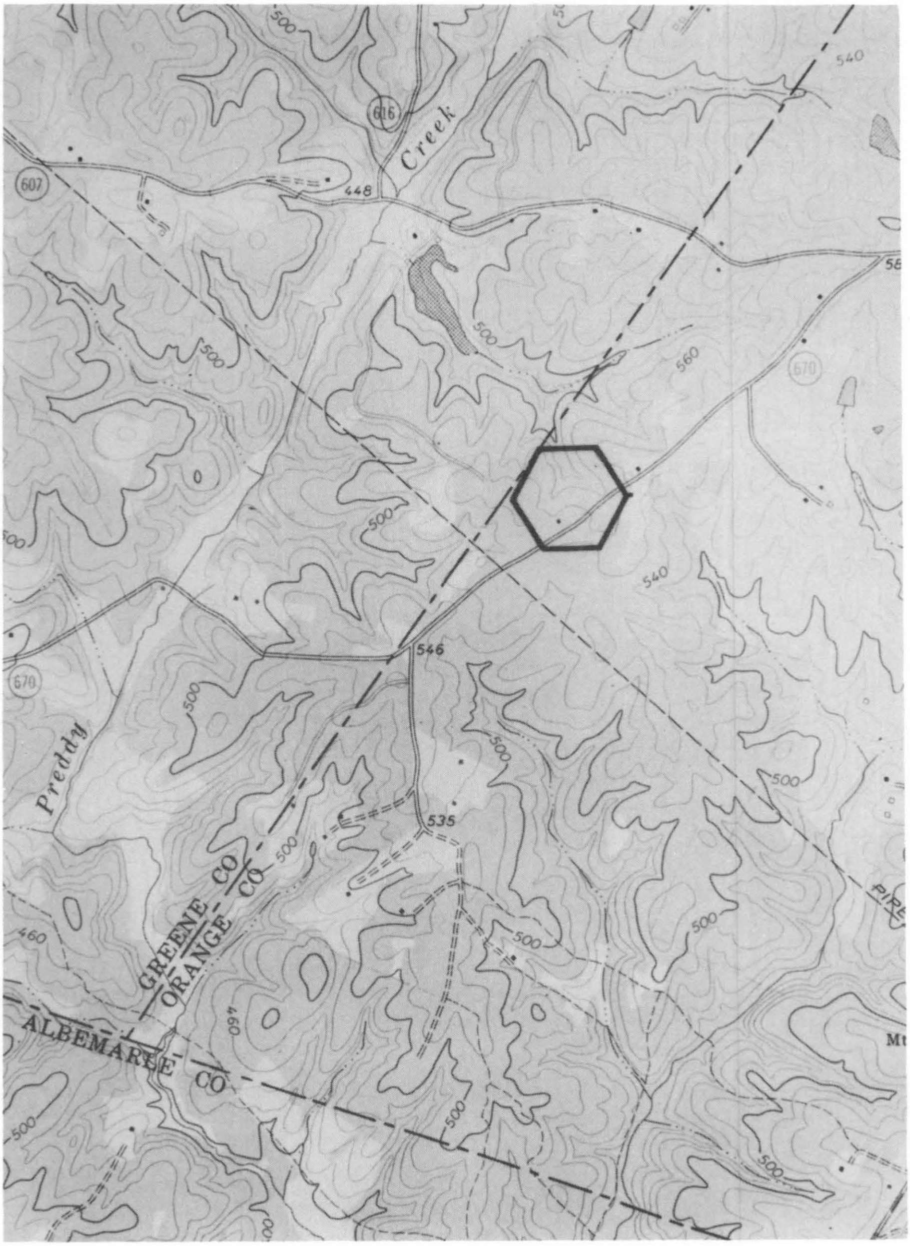
Classification: Typic Hapludult, clayey, oxidic (kaolinitic), mesic

Trip Comments: The soil appeared too deep and too firm for the Elioak concept. It resembled the Cecil concept and possibly had a capping or overlay because of the texture and consistance.



Elioak Site 1. Orange County soil survey.
Map sheet 30. (1:15,840)

ElB2 = Elioak fine sandy loam, 2-7% slopes, eroded
ElC2 = Elioak fine sandy loam, 7-15% slopes, eroded
GlB2 = Glenelg loam, 2-7% slopes, eroded
SeB = Seneca fine sandy loam, 2-7% slopes
EmC2 = Elioak clay loam, 7-15% slopes, severely eroded



Elioak Site 1. Orange County.
Topographic map (1:24,000)
Barboursville quadrangle.

PROFILE 1 (E1-1)

Ap--0 to 20 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz.

B2t--20 to 158 cm, yellowish red (5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; many, common mica flakes.

C--158 to 179 cm; variegated red, yellow, and brown silt loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 2 (E1-2)

Ap--0 to 26 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz; common, fine mica flakes.

B2t--26 to 160 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; many, fine mica flakes.

C--160 to 190 cm, red (2.5YR 4/6) sandy clay loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 3 (E1-3)

Ap--0 to 31 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz, common, fine mica flakes.

B2t--31 to 155 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; many, fine mica flakes.

C--155 to 180 cm, yellowish red (5YR 4/6) sandy clay loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

Elioak Site 1

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				E1-1					
A	4.40	0.06	0.07	0.07	8.80	1.85	0.20	9.00	2.22
B	4.99	0.13	0.48	0.28	10.80	3.05	0.89	11.69	7.61
C	5.00	0.08	0.17	0.13	6.40	2.05	0.38	6.78	5.60
Co.Se.	4.30	0.11	0.13	0.15	8.80	2.45	0.39	9.19	4.24
				E1-2					
A	4.38	0.42	0.14	0.16	13.60	2.85	0.72	14.32	5.03
B	4.97	0.12	0.48	0.22	11.20	3.05	0.82	12.02	6.82
C	4.99	0.04	0.17	0.06	7.60	2.15	0.27	7.87	3.43
Co.Se.	5.07	0.14	0.15	0.15	8.00	2.15	0.44	8.44	5.21
				E1-3					
A	4.56	0.12	0.07	0.11	7.40	1.75	0.30	7.70	3.90
B	5.11	0.09	0.43	0.21	11.80	2.75	0.73	12.53	5.83
C	5.03	0.05	0.18	0.12	10.60	2.05	0.35	10.95	3.20
Co.Se.	5.17	0.12	0.21	0.17	8.80	1.85	0.50	9.30	5.38

Elioak Site 1

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Sand Total	Silt	Clay	Textural Class
	percent								
				E1-1					
A	0.5	2.2	8.4	16.5	15.0	42.6	46.2	11.1	l
Co.Se.	0.6	1.3	4.5	9.7	9.7	25.7	30.8	43.5	c
C	0.2	0.8	4.2	17.1	23.0	45.3	33.6	21.1	l
				E1-2					
A	0.7	2.7	8.6	16.9	13.2	42.1	45.1	12.8	l
Co.Se.	0.4	0.8	2.8	7.6	7.9	19.4	25.8	54.9	c
C	0.9	4.6	15.1	15.9	17.3	53.8	19.4	26.8	scl
				E1-3					
A	0.8	2.2	7.9	18.7	15.1	44.7	43.7	11.6	l
Co.Se.	0.2	0.7	2.3	5.0	8.9	17.1	27.2	55.6	c
C	0.1	2.6	15.7	19.7	19.8	58.0	18.4	23.6	scl

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
E1-1	88	8	1	Tr	Tr	--	3
E1-2	92	2	1	--	1	2	2
E1-3	89	2	2	--	Tr	3	4
E1-1(C)	68	--	20	2	--	--	--

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
E1-1	64	4	29	4	--
E1-2	40	3	47	10	--
E1-3	45	6	39	10	--

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
E1-1	7	5	53	13	19	3	--	--
E1-2	5	5	55	14	17	4	--	--
E1-3	3	5	60	9	19	4	--	--
E1-1(C)	5	Tr	68	--	27	Tr	--	--

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
E1-1	45.3	3.3	11.4	24.3	5.7	8.3	1.3	---	0.8	---
E1-2	30.8	1.2	15.0	32.8	7.7	9.3	2.2	0.4	0.4	---
E1-3	29.1	1.9	13.7	36.1	5.0	10.6	2.2	0.5	0.7	---

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
E1-1	10.7	5.7	0.28
E1-2	14.3	4.9	0.30
E1-3	14.8	4.8	0.31

Elioak Site 2

Location: Orange County, Virginia, 2200 ft. NW of Chestnut Grove Church, 75 ft. W off Rt. 33.

Elevation: 530 ft.

Vegetation: One year cutover

Parent Material: Lynchburg Formation phyllites and schists

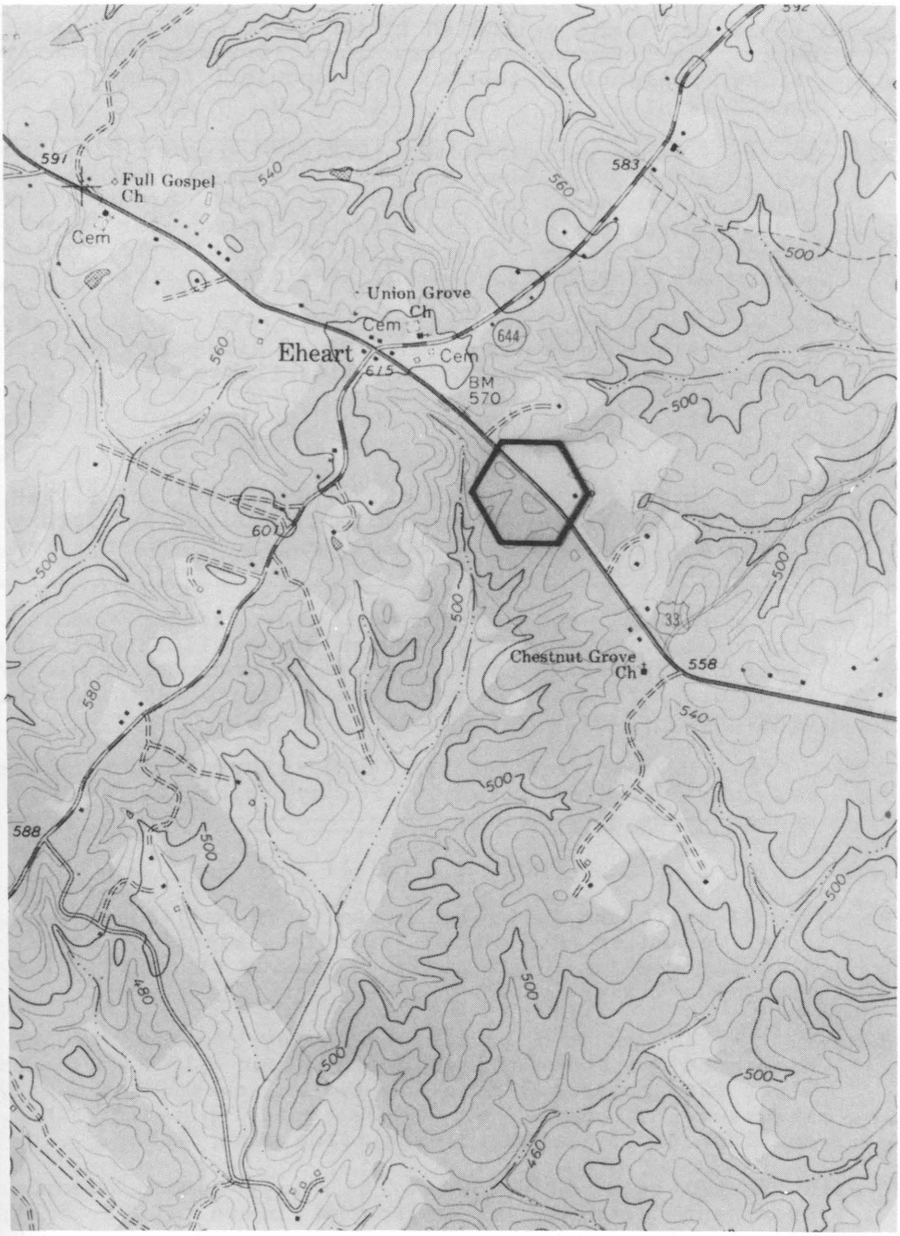
Drainage: Well

Classification: Typic Hapludult, clayey, oxidic (kaolinitic), mesic

Trip Comments: The soil appeared to have a 6 to 7 ft. overlay. Rounded quartzite gravel was found at that depth.

Elioak Site 2. Orange County soil survey.
Map sheet 31. (1:15,840)

ElB2 = Elioak fine sandy loam, 2-7% slopes, eroded
ElC2 = Elioak fine sandy loam, 7-15% slopes, eroded
GlB2 = Glenelg loam, 2-7% slopes, eroded
HaC = Hazel loam, 7-15% slopes
WbB = Watt silt loam, 2-7% slopes
WoB = Worsham silt loam, 2-7% slopes



Elioak Site 2. Orange County.
Topographic map (1:24,000)
Barboursville quadrangle.

PROFILE 1 (E2-1)

Ap--0 to 28 cm, light yellowish brown (10YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz.

B2t--28 to 170 cm, yellowish red (5YR 5/8) (upper B2t) and red (2.5YR 4/6) (lower B2t) clay; common, medium and coarse, prominent mottles of yellowish brown (10YR 6/8); moderate, fine and medium, subangular blocky structure; friable, sticky, slightly plastic; thin, continuous clay films; common, fine mica flakes.

C--170 to 180 cm, yellowish red (5YR 4/6) loam; structureless massive; friable, slightly sticky, slightly plastic; common, fine mica flakes.

PROFILE 2 (E2-2)

Ap--0 to 28 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz; few, fine mica flakes.

B2t--28 to 167 cm, red (2.5YR 4/6) clay; common, medium, prominent mottles of yellowish brown (10YR 6/6) in lower B2t; moderate, fine and medium, subangular blocky structure; friable, sticky, slightly plastic; thin, continuous clay films; common, fine mica flakes.

C--167 to 175 cm, red (2.5YR 4/6) clay; structureless massive; friable, slightly sticky, slightly plastic; common, fine mica flakes.

PROFILE 3 (E2-3)

Ap--0 to 21 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz; few, fine mica flakes.

B2t--21 to 163 cm, red (2.5YR 4/6) clay; common, medium, prominent mottles of yellowish brown (10YR 5/6) in lower B2t; moderate, fine and medium, subangular blocky structure; friable, sticky, slightly plastic; thin, continuous clay films; common, fine mica flakes.

C--163 to 170 cm, red (2.5YR 4/.6) clay; common, medium, prominent mottles of yellowish brown (10YR 5/8); structureless massive; friable, slightly sticky, slightly plastic; common, fine mica flakes.

Elioak Site 2

Hori- zon	pH	Ca	Mg	K	H	Al	Sub- Total	Total	Base Sat.
		meq/100g							%
				E2-1					
A	4.59	0.27	0.10	0.10	12.00	1.95	0.47	12.47	3.77
B	5.02	0.08	0.65	0.13	9.20	2.65	0.86	10.06	8.55
C	5.08	0.06	0.20	0.06	5.40	1.35	0.32	5.72	5.59
Co.Se.	5.40	0.08	0.38	0.11	11.20	2.35	0.57	11.77	4.84
				E2-2					
A	4.71	0.44	0.14	0.12	5.80	1.55	0.70	6.50	10.77
B	4.97	0.11	0.73	0.18	9.00	2.75	1.02	10.02	10.18
C	5.07	0.07	0.41	0.12	9.60	2.45	0.60	10.20	5.88
Co.Se.	5.40	0.11	0.42	0.15	12.00	2.75	0.68	12.68	5.36
				E2-3					
A	4.48	0.19	0.11	0.07	8.60	2.05	0.37	8.97	4.12
B	5.13	0.08	0.66	0.21	10.20	2.65	0.95	11.15	8.52
C	5.10	0.09	0.59	0.19	11.80	2.85	0.87	12.67	6.87
Co.Se.	5.38	0.10	0.48	0.17	10.80	1.95	0.75	11.55	6.49

Elioak Site 2

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Total	Silt	Clay	Textural Class
				percent					
				E2-1					
A	1.5	2.4	5.0	12.9	15.8	37.7	50.5	11.7	sil-l
Co.Se.	1.4	1.7	2.5	6.4	11.4	23.5	34.1	42.5	c
C	4.5	5.7	9.9	23.1	18.2	61.4	16.9	21.8	scl
				E2-2					
A	2.2	2.8	5.2	14.3	16.9	41.4	44.6	14.0	l
Co.Se.	2.0	1.7	2.5	7.5	10.9	24.7	30.7	44.6	c
C	3.9	4.5	6.7	12.4	10.9	38.3	19.8	41.9	c
				E2-3					
A	2.8	2.7	5.1	15.6	16.2	42.3	44.6	13.1	l
Co.Se.	1.0	1.8	2.9	9.5	11.6	26.9	34.9	38.2	cl-c
C	4.0	3.7	3.4	9.7	8.8	29.6	18.3	52.2	c

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
E2-1	90	8	Tr	Tr	--	1	1
E2-2	82	10	Tr	--	1	4	3
E2-3	89	8	--	--	Tr	2	1
E2-1(C)	89	6	1	--	Tr	3	1

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
E2-1	65	12	20	3	--
E2-2	63	13	19	5	--
E2-3	73	12	13	2	--

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
E2-1	5	15	53	7	14	2	--	4
E2-2	7	10	53	13	10	3	--	4
E2-3	5	15	54	12	8	2	--	4
E2-1(C)	5	10	51	13	14	2	--	5

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
E2-1	45.4	7.7	13.2	23.5	3.0	6.0	0.9	0.2	0.2	--
E2-2	42.7	8.3	10.3	25.1	5.8	4.5	1.3	1.0	0.7	--
E2-3	51.3	7.9	10.2	21.3	4.6	3.1	0.8	0.5	0.3	--

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
E2-1	12.6	6.6	0.32
E2-2	14.1	6.7	0.35
E2-3	12.6	7.4	0.35

Elioak Site 3

Location: Greene County, Virginia, Henshaw Brothers Farm near Jimmy Henshaw, 4500 ft. NNW of Rts. 609 and 619, 100 ft. off Rt. 619.
Elevation: 625 ft.

Vegetation: Mixed hardwoods and pines

Parent Material: Mechum River Phyllites

Drainage: Well

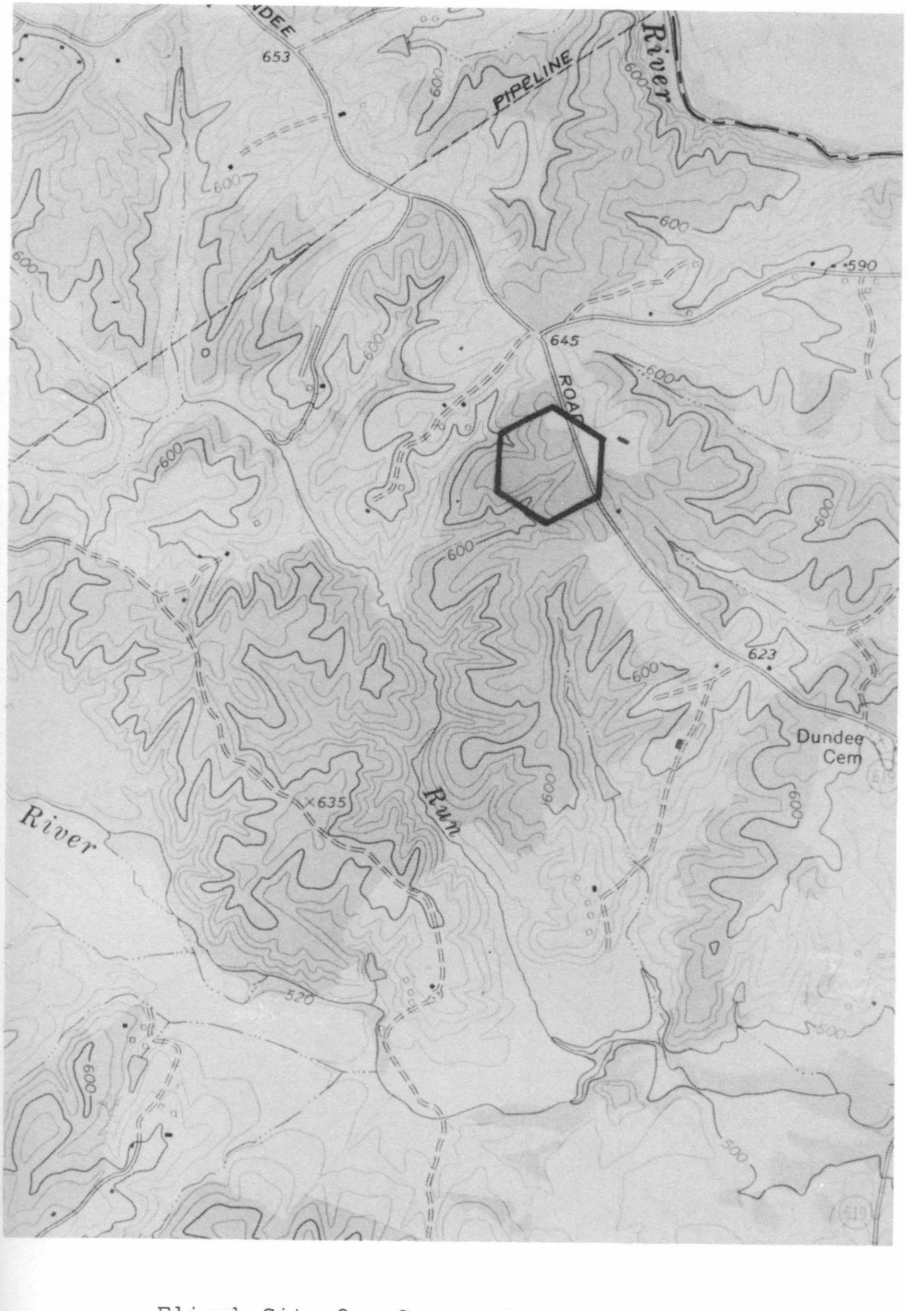
Classification: Typic Hapludult, clayey, oxidic, mesic

Comments: Loaded with mica throughout

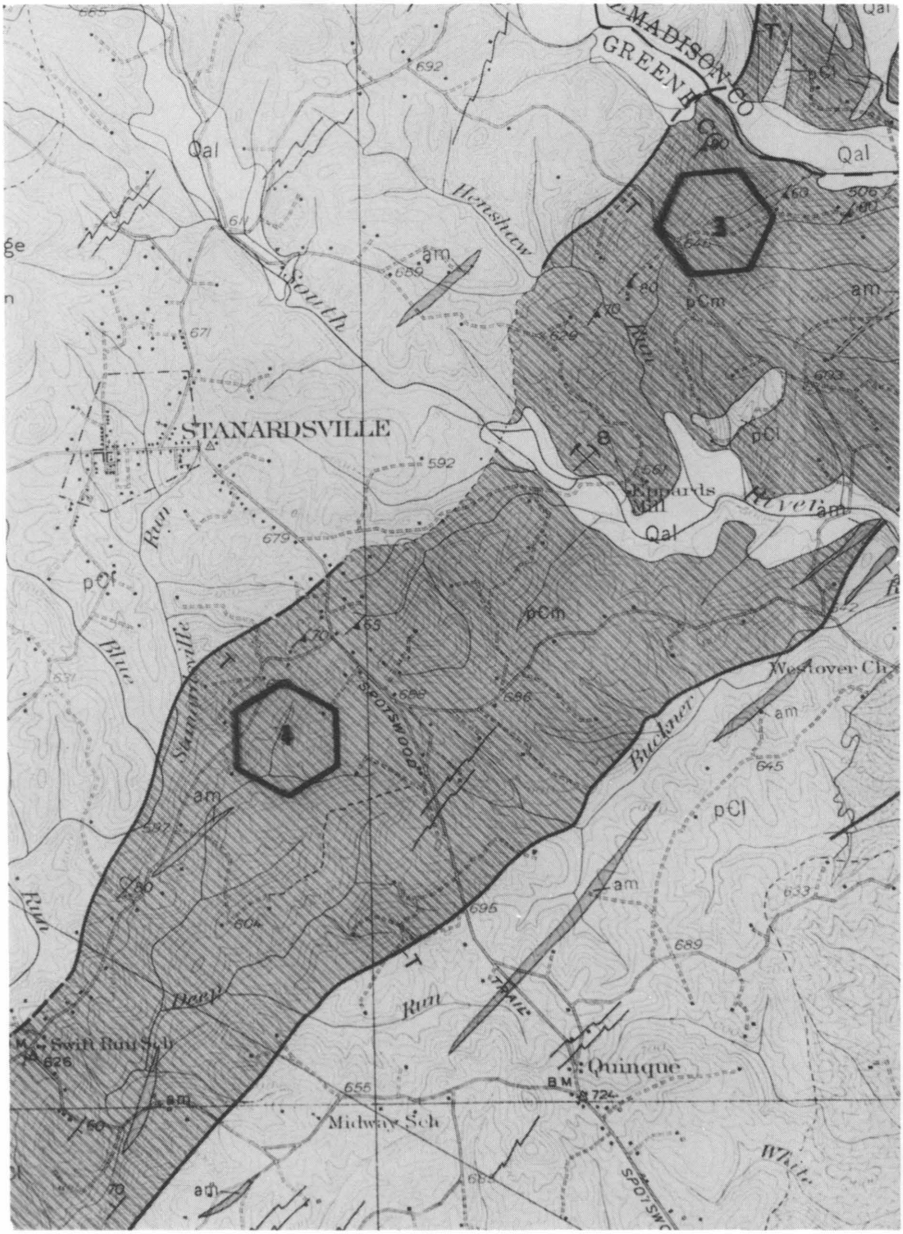
Trip Comments: This site was said to be very near the Elioak concept. This soil felt like Elioak (more friable than Elioak Sites 1 and 2). It had no overlay and a shallow solum.

Elioak Site 3. Greene County soil survey
(1:15,840)

1B,26B = Elioak loam, 2-7% slopes
34C = Elioak clay loam, 7-15% slopes
3B = Gleneg loam, 7-15% slopes
33C = Elioak clay loam, 7-15% slopes, severely eroded



Elioak Site 3. Greene County.
Topographic map (1:24,000)
Standardsville quadrangle.



Elioak Sites 3 and 4. Greene County Geologic Map. (1:62,500)

pCm = Mechum River formation
pCl = Lovingston formation
pCrv = Robertson River formation
pCly = Lynchburg formation

PROFILE 1 (E3-1)

Ap--0 to 20 cm, light brown (7.5YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz.

B2t--20 to 94 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films.

C--94 to 178 cm, red (2.5YR 4/6) loam; structureless massive; very friable, slightly sticky, nonplastic.

PROFILE 2 (E3-2)

Ap--0 to 23 cm, light brown (7.5YR 6/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz.

B2t--23 to 99 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films.

C--99 to 169 cm, red brown (2.5YR 4/4) loam; structureless massive; friable, slightly sticky, nonplastic.

PROFILE 3 (E3-3)

Ap--0 to 20 cm, light brown (7.5YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz.

B2t--20 to 97 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films.

C--97 to 150 cm, yellowish brown (10YR 5/6) loam; structureless massive; friable, slightly sticky, nonplastic.

Elioak Site 3

Hori-zon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				E3-1					
A	4.30	0.11	0.12	0.14	11.20	2.85	0.37	11.57	3.20
B	5.00	0.07	0.70	0.25	13.80	4.45	1.02	14.82	6.88
C	5.12	0.07	0.37	0.13	5.80	2.05	0.57	6.37	8.95
Co.Se.	5.25	0.10	0.24	0.12	10.60	1.75	0.46	11.06	4.16
				E3-2					
A	3.89	0.16	0.15	0.16	10.40	2.95	0.47	10.87	4.32
B	4.68	0.08	0.62	0.33	12.20	3.65	1.03	13.23	7.79
C	4.82	0.14	0.44	0.11	7.60	3.05	0.69	8.29	8.32
Co.Se.	5.14	0.11	0.40	0.08	9.20	2.95	0.59	9.79	6.03
				E3-3					
A	4.03	0.15	0.25	0.24	14.00	3.65	0.64	14.64	4.37
B	5.03	0.08	0.96	0.42	12.00	3.65	1.46	13.46	10.85
C	4.86	0.05	0.51	0.16	6.40	2.65	0.72	7.12	10.11
Co.Se.	5.23	0.12	0.52	0.14	9.40	3.05	0.78	10.18	7.66

Elioak Site 3

Horizon	Sand VC	C	M	F	VF	Total	Silt	Clay	Textural Class
	percent								
				E3-1					
A	0.9	1.4	1.9	7.9	18.9	31.0	52.0	17.0	sil
Co.Se.	0.1	0.5	0.8	2.7	10.7	14.9	28.9	56.2	c
C	1.2	4.2	3.5	7.5	20.7	37.1	48.3	14.6	l
				E3-2					
A	0.4	1.3	2.3	8.2	20.2	32.5	50.4	17.1	l-sil
Co.Se.	0.2	0.4	0.9	3.0	15.0	19.6	37.8	42.6	c
C	0.0	0.0	0.3	4.5	43.6	48.4	33.1	18.6	l
				E3-3					
A	0.8	1.2	2.8	8.7	18.8	32.4	49.8	17.8	l-sil
Co.Se.	0.3	0.2	0.6	2.6	11.1	14.8	26.1	59.1	c
C	0.4	0.3	1.5	9.7	31.3	43.2	41.0	15.8	l

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
E3-1	87	9	Tr	Tr	--	3	1
E3-2	87	7	1	Tr	Tr	4	1
E3-3	85	3	1	9	--	2	--
E3-1(C)	73	--	18	1	--	1	7

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
E3-1	54	5	30	11	--
E3-2	50	3	37	10	--
E3-3	43	10	35	12	--

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
E3-1	6	2	50	18	22	2	--	--
E3-2	10	5	60	15	8	2	--	--
E3-3	5	5	53	20	14	3	--	--
E3-1(C)	5	Tr	77	Tr	18	--	--	Tr

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
E3-1	32.0	2.7	9.8	31.3	10.1	12.4	1.1	0.4	0.1	---
E3-2	40.3	2.5	16.3	29.4	6.4	3.4	0.9	0.8	0.2	---
E3-3	26.8	3.0	13.5	34.4	11.8	8.3	1.8	0.3	---	---

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
E3-1	13.9	2.8	0.27
E3-2	10.9	4.7	0.28
E3-3	14.8	4.8	0.28

Elioak Site 4

Location: Greene County, Virginia, Wildwood Valley; 4700 ft. NW of Rt. 33 and Woodridge Subdivision Road, 3050 ft. W of Watertown, 75 ft. off Wildwood Valley Subdivison Road.
Elevation: 635 ft.

Vegetation: Mixed hardwoods and pines

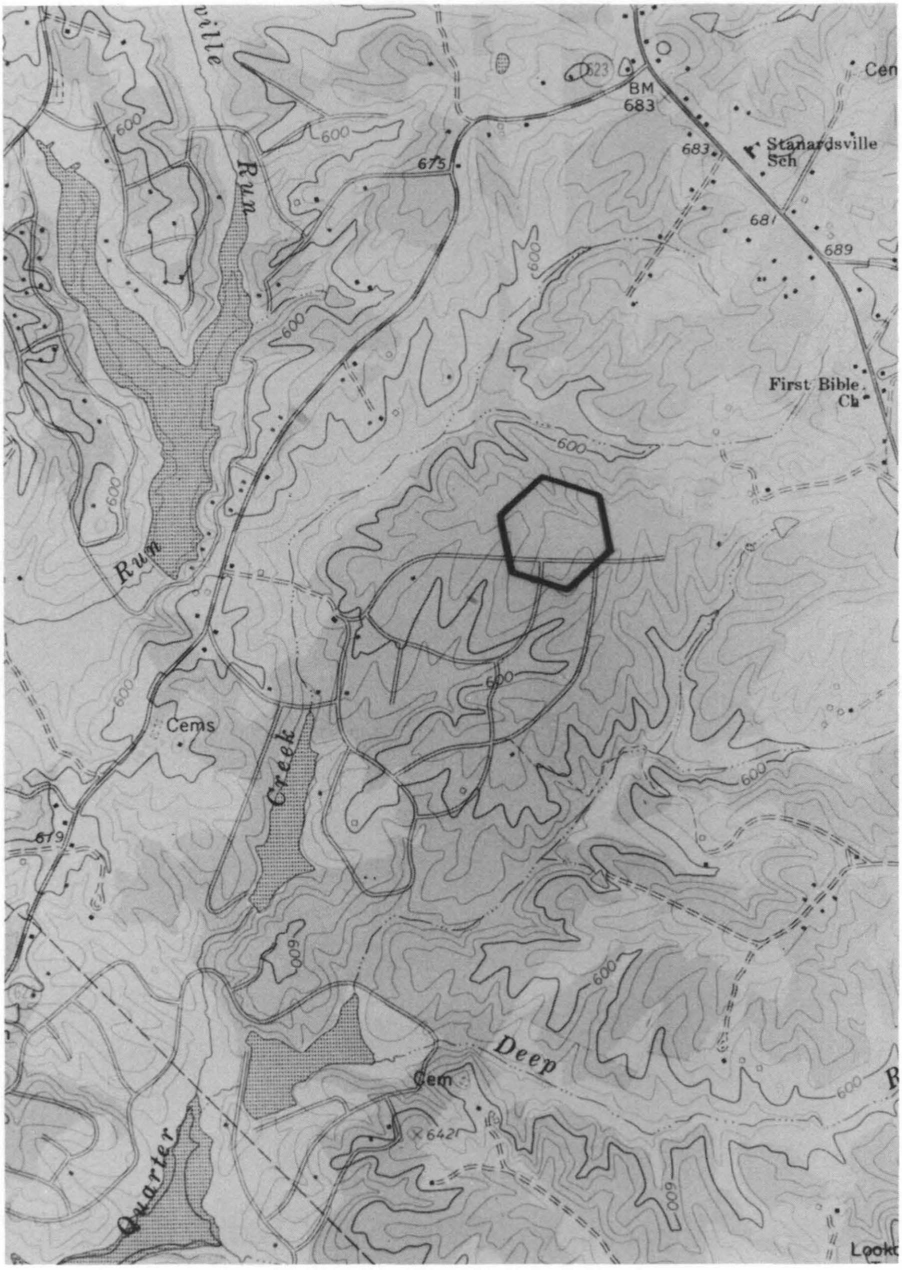
Parent Material: Phyllites and mica schist

Drainage: Well

Classification: Typic Hapludult, clayey, kaolinitic (mixed), mesic

Trip Comments: This soil was near the Elioak concept, similar to Elioak Site 3. There was a slight appearance of an overlay, but it was inconclusive.

Elioak Site 4. Greene County soil survey
(1:15,840)
1B,26B = Elioak loam, 2-7% slopes
34C = Elioak clay loam, 7-15% slopes
3B = Gleneg loam, 7-15% slopes
33C = Elioak clay loam, 7-15% slopes, severely eroded



Elioak Site 4. Greene County.
Topographic map (1:24,000)
Standardsville quadrangle.

PROFILE 1 (E4-1)

Ap--0 to 20 cm, yellowish brown (10YR 6/6) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz.

B2t--20 to 90 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, sticky, slightly plastic; thick, continuous clay films.

C--90 to 165 cm, yellowish red (5YR 5/6) loam; structureless massive; friable, slightly sticky, nonplastic; 5% subangular fragments of quartz.

PROFILE 2 (E4-2)

Ap--0 to 18 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; common, fine, mica flakes.

B2t--18 to 122 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; many, fine mica flakes.

C--122 to 180 cm, strong brown (7.5YR 5/8) silt loam; structureless massive; friable, slightly sticky, nonplastic; very many, fine mica flakes.

PROFILE 3 (T4-3)

Ap--0 to 23 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz; common, fine mica flakes.

B2t--23 to 145 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; many, fine mica flakes.

C--145 to 175 cm, reddish brown (2.5YR 5/4) sandy loam; structureless massive; friable, slightly sticky, slightly plastic; very many, fine mica flakes.

Elioak Site 4

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				E4-1					
A	4.17	0.08	0.12	0.21	10.00	3.25	0.41	10.41	3.94
B	4.89	0.07	0.47	0.15	12.40	4.45	0.69	13.09	5.27
C	4.89	0.03	0.09	0.06	5.40	2.85	0.18	5.58	3.23
Co.Se.	4.96	0.11	0.05	0.04	8.20	2.95	0.20	8.40	2.38
				E4-2					
A	4.23	0.06	0.10	0.14	11.20	2.85	0.30	11.50	2.61
B	4.91	0.04	0.39	0.12	10.60	3.45	0.55	11.15	4.93
C	5.03	0.08	0.06	0.04	4.20	1.75	0.18	4.38	4.11
Co.Se.	5.02	0.11	0.08	0.03	8.60	2.85	0.22	8.82	2.49
				E4-3					
A	4.24	0.09	0.11	0.14	11.40	3.05	0.34	11.74	2.90
B	4.23	0.04	0.17	0.09	9.80	3.55	0.30	10.10	2.97
C	4.57	0.05	0.07	0.02	4.20	2.15	0.14	4.34	3.23
Co.Se.	5.00	0.07	0.03	0.03	10.00	2.75	0.13	10.13	1.28

Elioak Site 4

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Sand Total	Silt	Clay	Textural Class
	percent								
				E4-1					
A	3.0	2.5	4.3	15.6	17.4	42.9	38.6	18.5	l
Co.Se.	0.6	1.0	1.3	5.6	9.0	17.5	30.1	52.4	c
C	3.6	7.3	5.9	11.8	20.3	48.9	38.9	12.2	l
				E4-2					
A	1.3	2.7	4.0	14.6	19.1	41.7	40.9	17.3	l
Co.Se.	0.4	0.8	1.1	3.7	7.1	13.2	25.2	61.6	c
C	0.5	1.7	4.6	14.3	26.8	47.9	49.6	2.4	sl-sil
				E4-3					
A	1.4	2.7	4.3	14.8	20.2	43.4	39.5	17.0	l
Co.Se.	0.1	0.5	0.6	1.2	3.5	5.9	36.5	57.5	c
C	4.3	7.0	7.8	20.6	17.5	57.2	33.7	9.1	sl

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
E4-1	95	2	Tr	Tr	1	2	--
E4-2	95	1	1	Tr	Tr	3	--
E4-3	92	2	Tr	--	Tr	6	--
E4-1(C)	91	--	8	Tr	--	1	--

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
E4-1	44	5	38	10	3
E4-2	45	10	32	13	--
E4-3	30	4	45	17	4

Clay Mineralogy

Pro-file	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
E4-1	8	6	44	18	21	3	--	--
E4-2	5	3	54	14	20	4	--	--
E4-3	3	3	52	23	15	4	--	--
E4-1(C)	5	10	48	5	32	Tr	--	Tr

Whole Soil Mineralogy

Pro-file	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
E4-1	34.0	1.9	14.5	26.1	10.3	11.0	1.6	0.4	--	--
E4-2	26.9	2.6	9.9	36.6	8.6	12.3	2.5	0.4	--	--
E4-3	18.1	1.6	18.1	36.1	14.7	8.6	2.3	0.4	--	--

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
E4-1	15.8	3.9	0.33
E4-2	17.4	3.7	0.29
E4-3	16.1	4.5	0.32

Elioak Site 5

Location: Fauquier County, Virginia, 10,500 ft. NW of Fauquier White Sulfur Springs at end of Rt. 681 on North Wales Property (Mr. Coats).

Elevation: 420 ft.

Vegetation: Grassland

Parent Material: Phyllite and mica schist

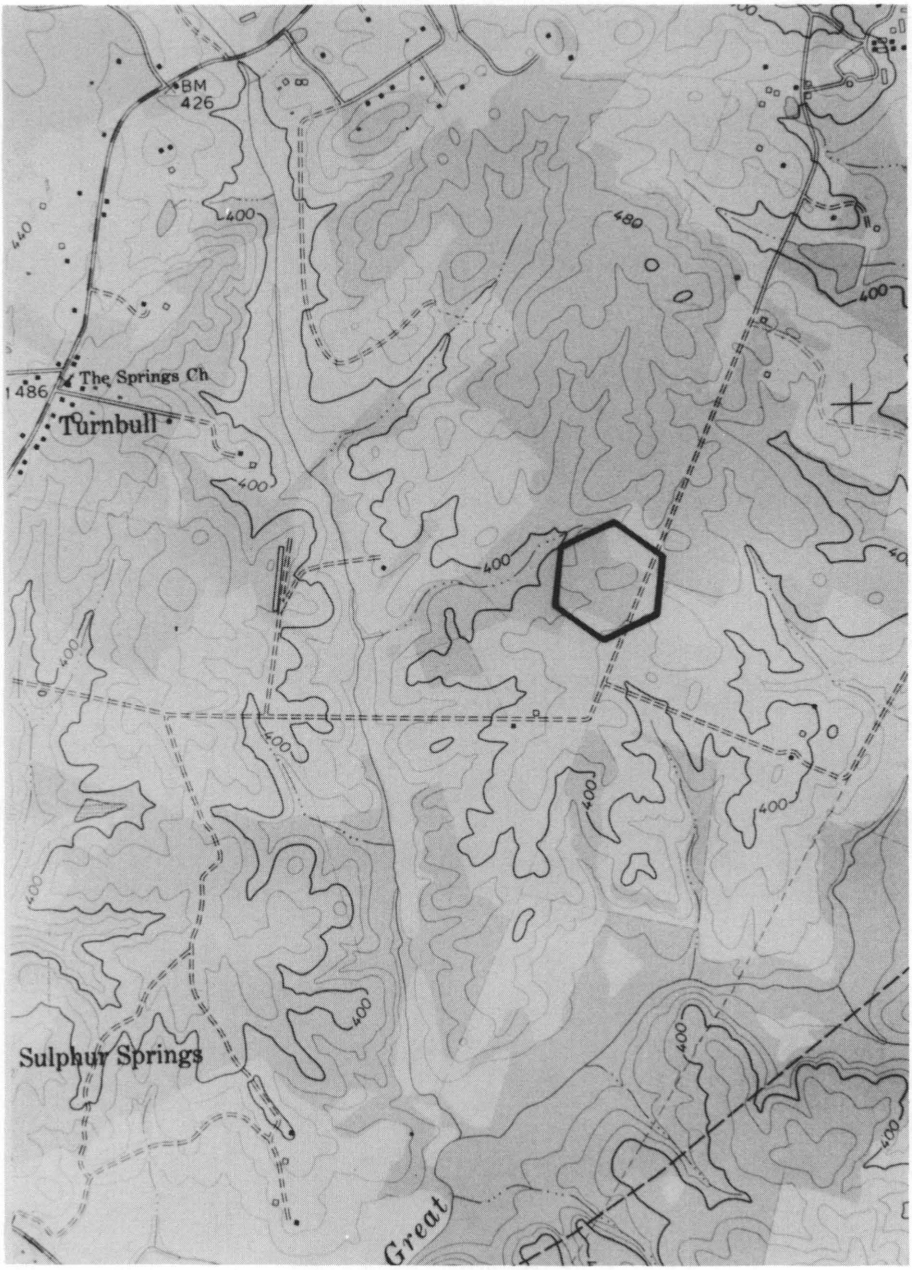
Drainage: Well

Classification: Typic Hapludult, clayey (fine loamy), oxidic (kaolinitic), mesic

Trip Comments: This soil was possibly formed in a metadiabase shearzone. It was placed near the Buckhall concept of Prince William County. It was also said to be between an acid Chester and a basic Glenelg. The profile is somewhat eroded and had a friable consistance. It was shallower to the C horizon than the ideal Elioak.

Elioak Site 5. Fauquier County soil survey.
Map Sheet 10. (1:21,120)

Ee = Elioak silt loam, 7-14% slopes
Ed = Elioak silt loam, 7-14% slopes, eroded
Ha = Hazel silt loam, 14-40% slopes
Hb = Hazel silt loam, 7-14% slopes
Sa = Seneca silt loam, 2-7% slopes



Elioak Site 5. Fauquier County.
Topographic map (1:24,000)
Warrenton quadrangle.

PROFILE 1 (E5-1)

Ap--0 to 10 cm, strong brown (7.5YR 5/8) clay loam; weak, medium, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz; many, fine mica flakes.

B2t--10 to 49 cm, yellowish red (5YR 5/8) clay loam; weak, fine, and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thin, patchy clay films; many, fine mica flakes.

C-- 49 to 156 cm, strong brown (7.5YR 5/6) silt loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); many Mn stains; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 2 (E5-2)

Ap--0 to 10 cm, strong brown (7.5YR 5/8) clay loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% angular fragments of quartz; many, fine mica flakes.

B2t--10 to 76 cm, yellowish red (5YR 5/8) clay loam; weak, medium subangular blocky structure; friable, slightly sticky, slightly plastic; thin, patchy clay films; many, fine mica flakes.

C--76 to 159 cm, yellowish red (5YR 5/8) very fine sandy loam; common, medium, distinct, mottles of yellowish brown (10YR 5/8); many Mn stains; structureless massive; friable, slightly sticky, slightly plastic; many, common mica flakes.

PROFILE 3 (E5-3)

Ap--0 to 9 cm, strong brown (7.5YR 5/8) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5 to 10% angular fragments of quartz; many, fine mica flakes.

B2t--9 to 67 cm, yellowish red (5YR 5/8) clay loam; weak, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thin, patchy clay films; many, fine mica flakes.

C--67 to 155 cm, yellowish red (5YR 5/8) very fine sandy loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); many Mn stains; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

Elioak Site 5

Hori-zon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		----	----	----	meq/100g	----	----	----	%
					E5-1				
A	5.63	3.95	1.30	0.32	6.80	0.05	5.57	12.37	45.03
B	5.01	0.69	0.84	0.25	8.80	2.35	1.78	10.58	16.82
C	5.09	0.14	0.55	0.16	6.20	1.65	0.85	7.05	12.06
Co.Se.	5.34	0.26	0.62	0.20	9.80	1.45	1.08	10.88	9.93
					E5-2				
A	5.93	5.12	1.51	0.39	6.80	0.05	7.02	13.82	50.80
B	4.91	0.42	0.57	0.26	8.60	3.25	1.25	9.85	12.69
C	5.11	0.52	0.70	0.14	7.20	1.65	1.36	8.56	15.89
Co.Se.	5.23	0.31	0.38	0.10	7.80	1.45	0.79	8.59	9.20
					E5-3				
A	6.43	5.81	1.38	0.22	5.20	0.05	7.41	12.61	58.76
B	5.17	1.15	1.30	0.23	9.20	1.85	2.68	11.88	22.56
C	5.31	0.17	1.53	0.21	8.60	1.95	1.91	10.51	18.17
Co.Se.	5.23	0.24	1.32	0.20	10.60	1.45	1.76	12.36	14.24

Elioak Site 5

Horizon	VC	C	M	F	VF	Total	Silt	Clay	Textural Class
	Sand								
	----	----	----	percent	----	----	----	----	
				E5-1					
A	0.9	1.1	1.8	8.1	12.3	24.2	46.0	29.7	cl
Co.Se.	0.3	0.7	1.5	7.1	12.7	22.4	36.5	41.1	c-cl
C	1.6	3.4	5.6	15.3	21.3	47.2	40.1	12.7	l
				E5-2					
A	0.2	0.6	1.9	7.3	11.8	21.9	48.3	29.8	cl
Co.Se.	0.3	0.6	1.4	6.5	12.5	21.4	38.3	40.3	c-cl
C	0.5	3.5	7.0	18.4	31.5	61.0	32.6	6.4	sl
				E5-3					
A	0.3	1.1	2.7	12.0	15.2	31.3	47.5	21.1	l
Co.Se.	2.1	2.7	3.5	12.0	17.4	37.8	32.0	30.1	cl
C	0.5	5.1	7.6	15.9	33.8	63.0	28.0	9.1	sl

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
E5-1	90	2	Tr	1	Tr	7	Tr
E5-2	86	1	Tr	Tr	Tr	13	--
E5-3	86	Tr	6	1	--	7	--
E5-1(C)	67	2	24	--	1	4	2

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
E5-1	2	8	81	9	--
E5-2	9	1	73	14	3
E5-3	5	3	66	12	14

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
E5-1	3	5	59	20	13	0.4	--	--
E5-2	5	2	65	18	10	0.3	--	--
E5-3	5	5	53	20	16	0.7	--	--
E5-1(C)	5	Tr	67	23	5	Tr	--	--

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
E5-1	22.1	3.3	31.7	27.5	8.2	5.3	0.2	1.6	--	--
E5-2	23.8	0.6	28.8	31.6	8.4	4.0	0.1	2.8	--	--
E5-3	35.6	1.0	25.3	19.8	10.5	4.8	0.2	2.6	--	--

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
E5-1	11.7	3.9	0.29
E5-2	11.6	2.1	0.29
E5-3	14.4	2.3	0.49

Elioak Site 6

Location: Fauquier County, Virginia, 1100 ft. NE from Rts. 674 and 605, approximately 700 ft. from Rt. 674.
Elevation: 425 ft.

Vegetation: Mixed hardwoods

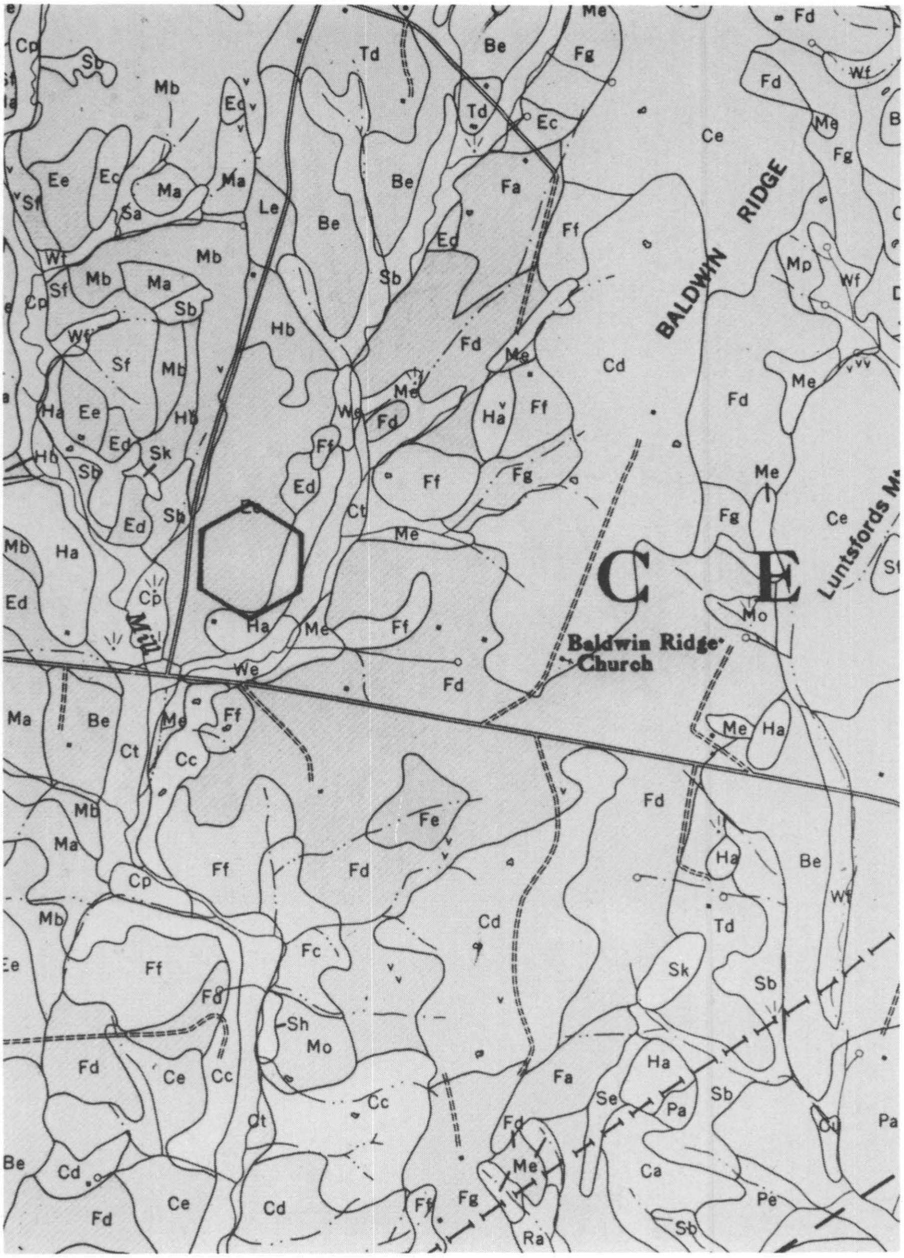
Parent Material: Phyllite and schist

Drainage: Well

Classification: Typic Hapludult, clayey, oxidic, mesic

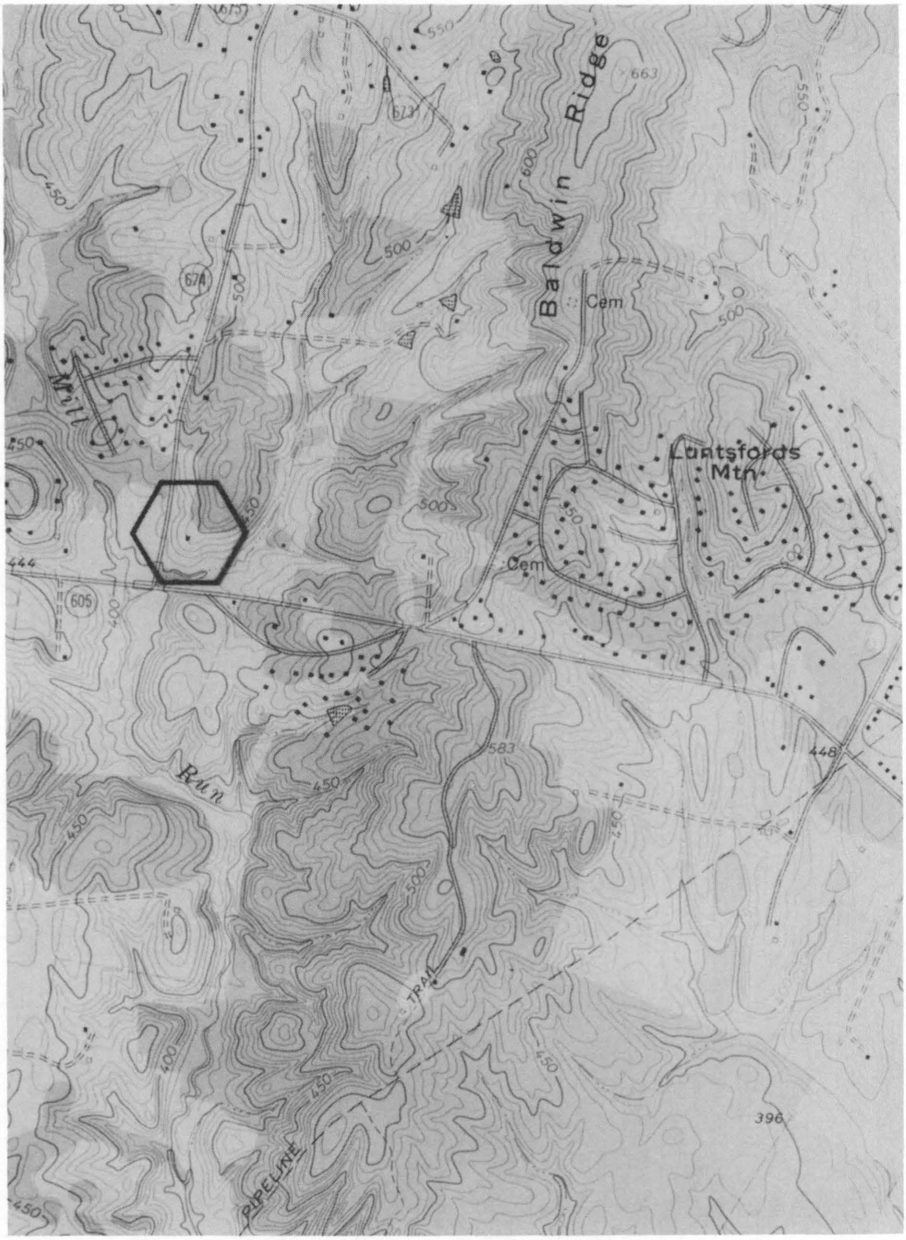
Comments: Eroded

Trip Comments: This site was difficult to relocate due to construction. On the ridgetop, the site was most near the Braddock concept (colluvial). The original site was downslope.



Elioak Site 6. Fauquier County soil survey.
Map Sheet 11. (1:21,120)

Ee = Elioak silt loam, 7-14% slopes
Ha = Hazel silt loam, 14-40% slopes
Hb = Hazel silt loam, 14-40% slopes
Fd = Fauquier silt loam, 7-14% slopes
Ff = Fauquier silty clay loam, 14-25% slopes, eroded



Elioak Site 6. Fauquier County.
Topographic map (1:24,000)
Catlett quadrangle.

PROFILE 1 (E6-1)

Ap--0 to 10 cm, yellowish red (5YR 5/6) clay loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz; many, fine mica flakes.

B2t--10 to 92 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; many, fine mica flakes.

C--92 to 145 cm, varigated red, yellow, brown silt loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 2 (E6-2)

Ap--0 to 10 cm, yellowish red (5YR 5/6) clay loam; weak, fine granular structure; friable, slightly sticky, slightly plastic; thick, continuous clay films; many, fine mica flakes.

B2t--10 to 60 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; many, fine mica flakes.

C--60 to 150 cm, varigated red, yellow, and brown very fine sandy loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 3 (E6-3)

Ap--0 to 10 cm, yellowish red (5YR 5/6) clay loam; weak, fine granular structure; friable, slightly sticky, slightly plastic; 5 to 10% angular fragments of quartz; many, fine mica flakes.

B2t--10 to 88 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thick, continuous clay films; many, fine mica flakes.

C--88 to 150 cm, varigated red, yellow, and brown very fine sandy loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

Elioak Site 6

Hori-zon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		----------------- meq/100g						-------------------	%
					E6-1				
A	4.48	0.14	0.34	0.33	15.40	4.05	0.81	16.21	5.00
B	4.91	0.09	1.23	0.37	13.40	4.55	1.69	15.09	11.20
C	5.01	0.03	0.20	0.14	6.20	2.15	0.37	6.57	5.63
Co.Se.	4.92	0.08	0.24	0.14	5.60	1.75	0.46	6.06	7.59
					E6-2				
A	4.39	0.08	0.14	0.16	12.60	4.05	0.38	12.98	2.93
B	4.72	0.08	1.27	0.20	14.00	5.15	1.55	15.55	9.97
C	5.02	0.96	1.10	0.18	4.80	2.45	2.24	7.04	31.82
Co.Se.	5.00	0.09	0.33	0.18	6.40	2.95	0.60	7.00	8.57
					E6-3				
A	4.22	0.16	0.33	0.26	13.00	3.95	0.75	13.75	5.45
B	4.68	0.08	1.18	0.34	12.20	3.95	1.60	13.80	11.59
C	4.82	0.04	0.13	0.11	6.20	2.75	0.28	6.48	4.32
Co.Se.	4.92	0.04	0.15	0.09	6.80	2.65	0.28	7.08	3.95

Elioak Site 6

Horizon	VC	C	M	F	VF	Total	Silt	Clay	Textural Class
	---------------Sand				----------------				
	--------------------percent							----------------------	
				E6-1					
A	1.7	0.8	1.5	10.3	17.4	31.8	38.9	29.3	cl
Co.Se.	0.2	0.4	0.7	8.0	19.7	29.0	21.8	49.2	c
C	0.1	0.5	1.4	29.9	39.7	71.7	17.6	10.8	sl
				E6-2					
A	0.6	1.1	1.6	10.5	17.5	31.4	41.3	27.2	cl-l
Co.Se.	0.0	0.3	1.1	11.5	25.5	38.5	12.9	48.6	c
C	0.0	0.2	0.7	26.9	39.2	67.0	23.2	9.8	sl
				E6-3					
A	0.9	0.8	1.4	9.4	15.8	28.3	36.4	35.3	cl
Co.Se.	0.2	0.3	0.8	10.7	20.7	32.7	22.6	44.7	c
C	0.4	0.4	0.9	25.0	40.2	66.9	22.3	10.8	sl

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
E6-1	80	--	15	--	Tr	4	Tr
E6-2	71	--	24	--	Tr	6	Tr
E6-3	67	--	28	--	1	2	2
E6-1(C)	60	--	31	2	2	5	--

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
E6-1	7	2	77	14	--
E6-2	12	4	70	14	--
E6-3	11	4	79	6	--

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
E6-1	3	9	67	6	12	0.4	2	--
E6-2	3	9	65	9	12	0.4	2	--
E6-3	3	9	63	6	17	0.4	2	--
E6-1(C)	5	5	67	5	18	Tr	--	--

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
E6-1	28.2	0.4	25.6	36.1	3.0	5.9	0.2	1.2	---	---
E6-2	30.3	0.5	22.6	33.4	4.4	5.8	0.2	2.3	---	---
E6-3	25.7	0.9	31.1	29.6	2.7	7.6	0.2	0.7	0.7	---

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
E6-1	17.3	2.1	0.36
E6-2	14.6	2.9	0.31
E6-3	15.8	2.9	0.36

Elioak Site 7

Location: Culpeper County, Virginia, 3000 ft. NW of Bethel Church on Rt. 609 and 4300 ft. WNW of Rts. 29 & 609, 500 ft. off Rt. 609.

Elevation: 565 ft.

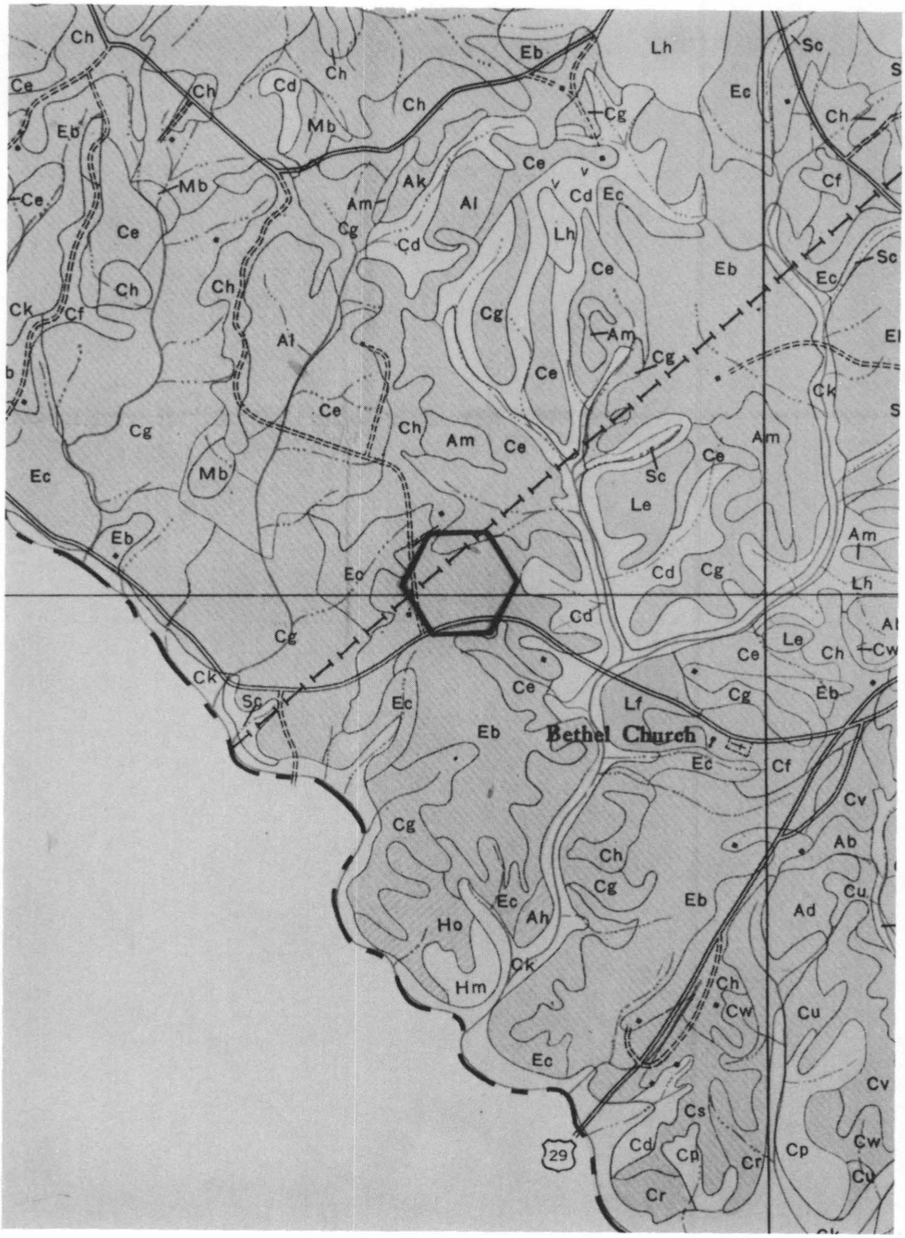
Vegetation: Hay (mainly weeds)

Parent Material: Robertson River formation- granitic crystalline rock

Drainage: Well

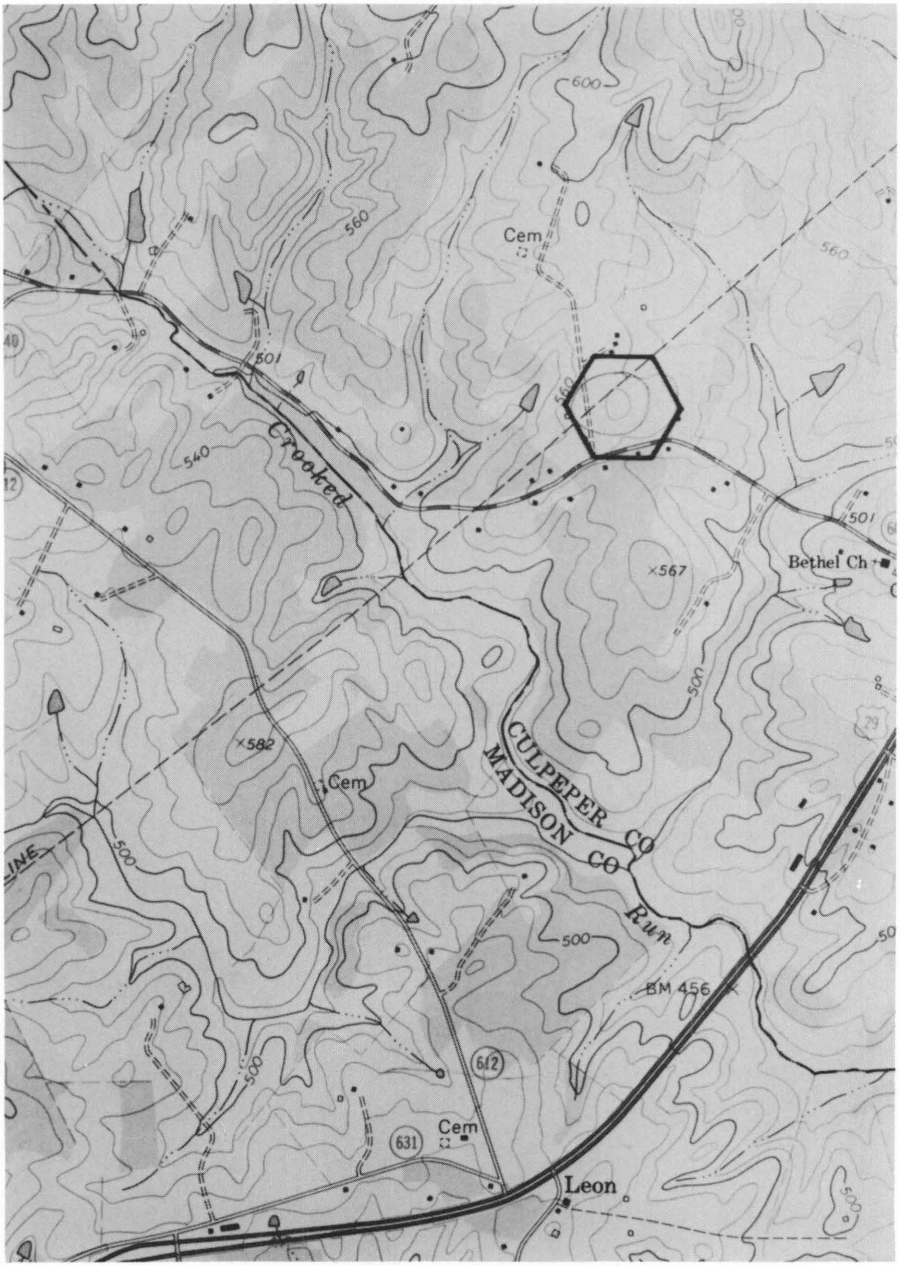
Classification: Typic Hapludult, clayey, oxidic, mesic

Trip Comments: Many series were postulated for this profile. It was said to be between the Cecil and Lloyd concepts (thought to be too red for the Cecil). Also stated to be a Haysville or a clayey Eubanks.



Elioak Site 7. Culpeper County soil survey.
Southwest Sheet. (1:24,000)

Eb = Elioak loam, 7-14% slopes
Ec = Elioak loam, 2-25% slopes, eroded
Ce = Cecil fine sandy loam, 7-14% slopes, eroded
Cg = Cecil fine sandy loam, 7-14% slopes
Al = Appling fine sandy loam, 7-14% slopes



Elioak Site 7. Culpeper County.
Topographic map (1:24,000)
Brightwood quadrangle.

PROFILE 1 (E7-1)

Ap--0 to 27 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 2 to 5% coarse fragments; common, fine mica flakes.

B2t--27 to 133 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; common, fine mica flakes.

C--133 to 181 cm, red (2.5YR 4/6) clay loam; fine, medium, distinct mottles of strong brown (7.5YR 5/8); structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 2 (E7-2)

Ap--0 to 28 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5 to 10% coarse fragments; common, fine mica flakes.

B2t--28 to 113 cm, red (2.5YR 4/8) clay; weak, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; many, fine mica flakes.

C--113 to 128 cm, red (2.5YR 4/8) sandy clay loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

R--128+ cm

PROFILE 3 (E7-3)

Ap--0 to 33 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 5% coarse fragments.

B2t--33 to 83 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thin, continuous clay films; common, fine mica flakes.

C--83 to 180 cm, red (2.5YR 4/6) sandy clay loam; common, fine and medium, distinct mottles of strong brown (7.5YR 5/8); structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

Elioak Site 7

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				E7-1					
A	5.51	2.71	0.46	0.08	5.80	0.15	3.25	9.05	35.91
B	5.23	1.00	1.04	0.21	6.80	1.05	2.25	9.05	24.86
C	5.18	0.10	0.53	0.31	10.00	2.35	0.94	10.94	8.59
Co.Se.	5.65	0.15	0.55	0.21	9.20	1.25	0.91	10.11	9.00
				E7-2					
A	5.48	1.59	0.40	0.37	5.20	0.45	2.36	7.56	31.22
B	5.24	0.97	0.81	0.27	7.40	1.35	2.05	9.45	21.69
C	5.20	0.15	0.46	0.30	6.80	1.65	0.91	7.71	11.80
Co.Se.	5.64	0.20	0.27	0.15	7.40	0.95	0.62	8.02	7.73
				E7-3					
A	5.47	1.81	0.36	0.12	4.60	0.25	2.29	6.89	33.24
B	5.38	1.64	0.84	0.25	6.60	0.75	2.73	9.33	29.26
C	5.29	0.42	0.84	0.32	8.00	1.55	1.58	9.58	16.49
Co.Se.	5.46	0.37	0.96	0.26	11.40	1.60	1.59	12.99	12.24

Elioak Site 7

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Sand Total	Silt	Clay	Textural Class
	percent								
				E7-1					
A	2.5	8.1	14.6	16.3	8.4	49.8	38.0	12.1	l
Co.Se.	2.7	6.1	10.8	11.2	7.2	37.9	21.7	40.4	c-cl
C	2.5	4.5	6.2	10.9	10.9	35.0	29.5	35.5	cl
				E7-2					
A	2.1	8.4	14.2	15.8	7.6	48.1	35.3	16.6	l
Co.Se.	2.1	5.6	9.2	10.2	7.2	34.3	21.2	44.6	c
C	2.7	8.4	13.4	15.7	11.6	51.8	16.9	31.3	scl
				E7-3					
A	1.9	7.4	15.8	17.7	8.8	51.6	38.1	10.4	l
Co.Se.	2.1	5.5	10.4	12.9	7.8	38.7	23.8	37.5	cl
C	3.7	7.1	8.5	16.0	13.4	48.7	19.5	31.8	scl

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
E7-1	56	41	Tr	1	Tr	1	1
E7-2	58	36	1	1	1	1	2
E7-3	54	44	Tr	Tr	Tr	1	1
E7-1(C)	67	15	11	5	Tr	1	1

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
E7-1	33	22	15	20	10
E7-2	20	22	21	25	12
E7-3	59	11	16	4	10

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
E7-1	10	5	62	7	10	6	--	--
E7-2	10	5	61	7	11	6	--	--
E7-3	10	5	44	15	20	6	--	--
E7-1(C)	Tr	Tr	78	Tr	18	4	--	Tr

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
E7-1	32.4	20.3	5.7	29.3	5.0	4.0	2.4	0.4	0.4	--
E7-2	28.6	16.9	7.2	32.5	5.6	4.9	2.7	0.3	0.7	--
E7-3	38.7	19.6	5.7	17.5	8.0	7.5	2.3	0.4	0.4	--

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
E7-1	8.9	4.6	0.28
E7-2	9.1	3.4	0.27
E7-3	5.4	5.8	0.21

Elioak Site 8

Location: Culpeper County, Virginia, 5000 ft. E of Rt. 633 and 643; 8700 ft. NW of Merrimac; at 90^0 curve in woods; 50 ft. from Rt. 643.

Elevation: 500 ft.

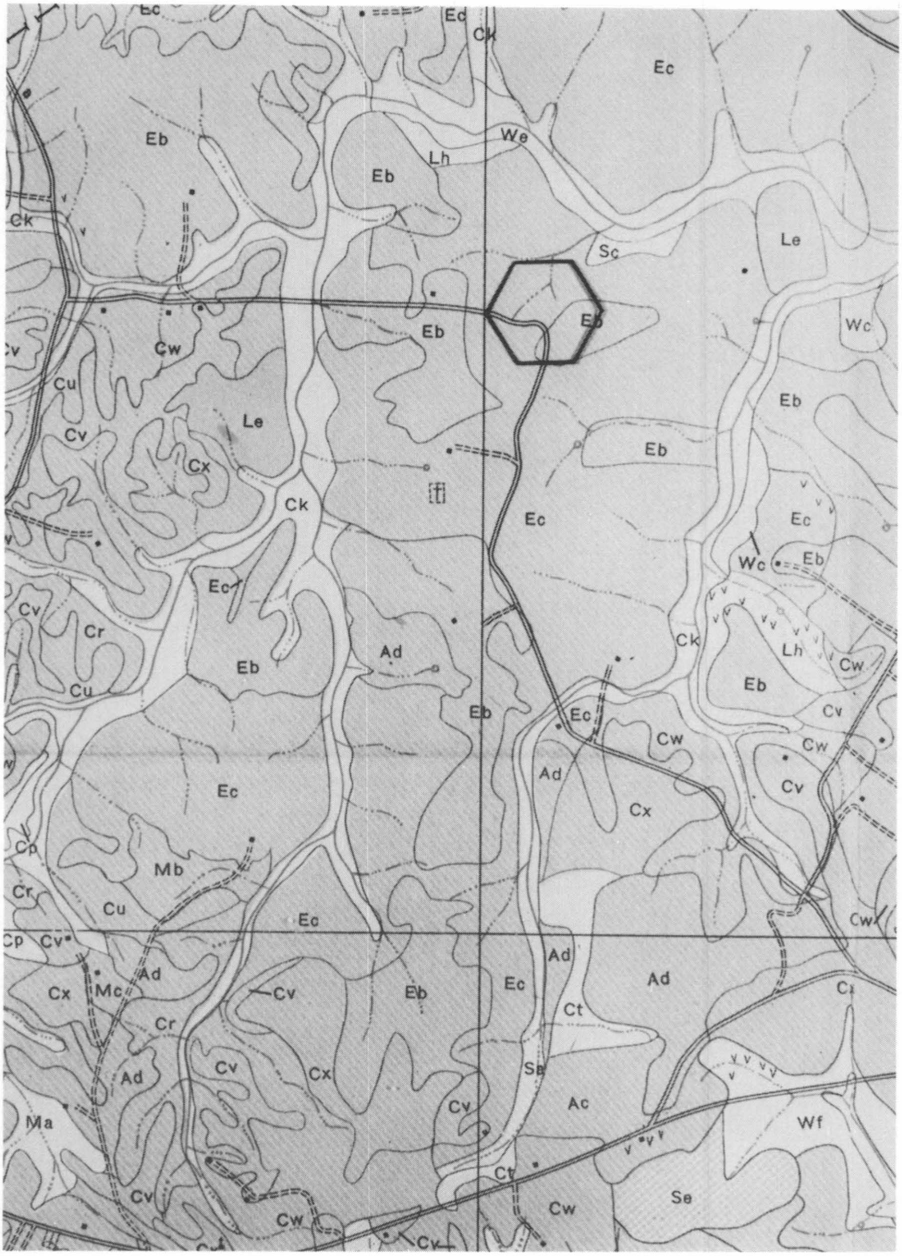
Vegetation: Pine and mixed hardwoods

Parent Material: Off of basic dike

Drainage: Well

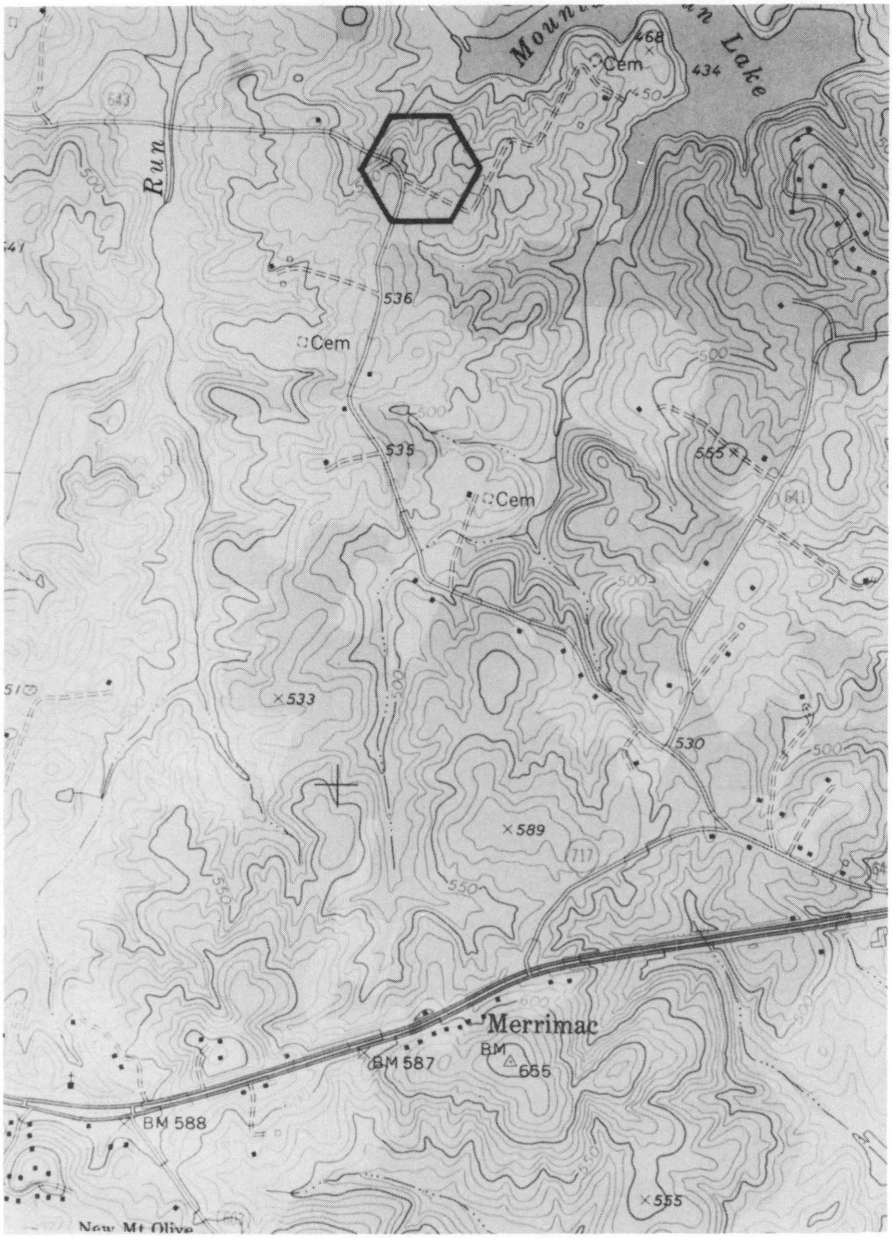
Classification: Typic Hapludult, clayey (fine loamy), oxidic, mesic

Trip Comments: The soil had high Fe (oxidic ratio). It was postulated to be a shallow Cullen, shallow Lloyd, or a Poindexter.



Elioak Site 8. Culpeper County soil survey. Southwest Sheet. (1:24,000)

Eb = Elioak loam, 7-14% slopes
Ec = Elioak loam, 2-25% slopes, eroded
Le = Lloyd clay loam, 7-14% slopes



Elioak Site 8. Culpeper County.
Topographic map (1:24,000)
Culpeper West quadrangle.

PROFILE 1 (E8-1)

Ap--0 to 29 cm, brown (7.5YR 5/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 15% coarse fragments.

B2t--29 to 130 cm, dark red (2.5YR 3/6) clay; weak, fine and medium, subangular blocky structure; friable, sticky, slightly plastic; thin, patchy clay films; 25% coarse fragments.

C--130 to 148 cm, yellowish red (5YR 5/8) loam; structureless massive; friable, slightly sticky, slightly plastic; 30% coarse fragments.

R--148+ cm

PROFILE 2 (E8-2)

Ap--0 to 23 cm, brown (7.5YR 5/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 25% coarse fragments.

B2t--23 to 103 cm, dark red (2.5YR 3/6) clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/8); weak, fine, subangular blocky structure; friable, sticky, slightly plastic; thin, patchy clay films; 30% coarse fragments.

C--103 to 149 cm, strong brown (7.5YR 5/8) clay loam; common, fine, medium, and coarse, distinct mottles of red (2.5YR 4/6); structureless massive; friable, slightly sticky, slightly plastic; 30% coarse fragments.

PROFILE 3 (E8-3)

Ap--0 to 22 cm, brown (7.5YR 5/4) silt loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 25% coarse fragments.

B2t--22 to 97 cm, yellowish red (5YR 5/6) (upper) and dark red (2.5YR 3/6) (lower) clay loam; weak, fine and medium, subangular blocky structure; friable, sticky, slightly plastic; thin, patchy clay films; 25% coarse fragments.

C--97 to 130 cm, strong brown (7.5YR 5/8) clay; common, fine, medium, and coarse, distinct mottles of red (2.5YR 4/6); structureless massive; friable, slightly sticky, slightly plastic; 25% coarse fragments.

Elioak Site 8

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				E8-1					
A	4.69	0.66	0.32	0.25	15.40	2.35	1.23	16.63	7.40
B	5.15	0.44	0.66	0.18	10.80	1.45	1.28	12.08	10.60
C	5.15	0.10	0.24	0.10	10.20	0.75	0.44	10.64	4.14
Co.Se.	5.70	0.20	0.19	0.05	9.20	0.40	0.44	9.64	4.56
				E8-2					
A	4.56	0.95	0.45	0.30	19.00	2.85	1.70	20.70	8.21
B	4.43	0.44	0.65	0.13	10.00	1.75	1.22	11.22	10.87
C	4.91	0.09	0.22	0.10	11.40	1.45	0.41	11.81	3.47
Co.Se.	5.58	0.11	0.19	0.06	10.80	0.90	0.36	11.16	3.23
				E8-3					
A	4.63	0.31	0.21	0.14	11.60	1.65	0.66	12.26	5.38
B	4.94	0.57	0.74	0.22	9.20	1.90	1.53	10.73	14.26
C	5.07	0.38	0.47	0.12	11.00	1.25	0.97	11.97	8.10
Co.Se.	5.55	0.34	0.35	0.08	11.60	0.75	0.77	12.37	6.22

Elioak Site 8

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Sand Total	Silt	Clay	Textural Class
	percent								
				E8-1					
A	2.9	2.4	3.6	9.2	12.7	30.9	52.0	17.2	sil-l
Co.Se.	2.6	2.9	2.6	6.1	13.9	28.0	21.7	50.3	c
C	2.1	3.5	4.2	10.2	18.8	38.8	36.5	24.6	l
				E8-2					
A	3.9	3.2	4.0	8.8	10.2	30.1	50.8	19.1	l-sil
Co.Se.	3.9	3.9	4.1	7.7	17.0	36.6	26.4	37.0	cl
C	0.7	2.4	2.9	6.4	14.2	26.7	37.2	36.1	cl
				E8-3					
A	4.2	2.8	2.2	9.6	12.9	31.7	52.2	16.1	sil
Co.Se.	5.5	4.9	3.5	5.8	10.8	30.4	37.4	32.2	cl
C	3.1	3.8	4.2	7.6	12.3	30.9	27.2	41.9	c

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
E8-1	77	3	Tr	--	Tr	14	6
E8-2	82	2	Tr	--	Tr	11	5
E8-3	66	2	Tr	Tr	--	15	17
E8-1(C)	93	--	Tr	1	--	6	--

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
E8-1	55	--	--	40	5
E8-2	45	5	5	45	--
E8-3	67	8	4	16	5

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
E8-1	10	3	50	7	14	16	--	--
E8-2	10	6	51	5	17	11	--	--
E8-3	10	3	47	9	23	8	--	--
E8-1(C)	Tr	Tr	62	Tr	16	12	--	Tr

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
E8-1	38.5	0.8	1.5	33.9	4.6	7.0	8.0	3.9	1.7	--
E8-2	45.6	2.0	3.5	30.8	1.9	6.3	4.1	4.0	1.8	--
E8-3	48.4	3.6	2.5	21.1	4.8	7.4	2.6	4.6	5.2	--

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
E8-1	18.3	2.6	0.52
E8-2	14.6	4.5	0.51
E8-3	14.9	5.1	0.54

Elioak Site 9

Location: Madison County, Virginia, 3350 ft. NNE of Good Hope Church, off Rt. 616, 1100 ft. from Rt. 616.

Elevation: 600 ft.

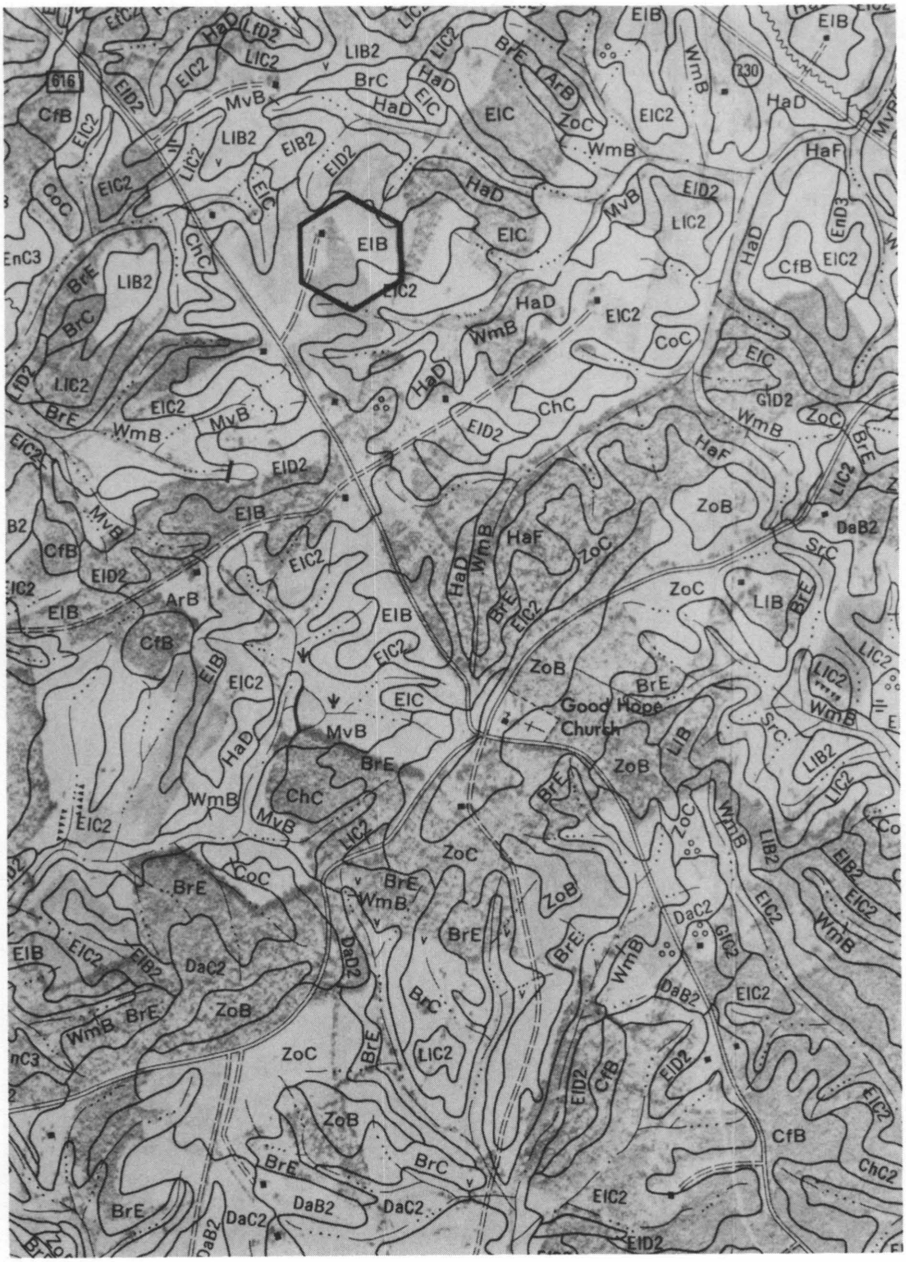
Vegetation: Pasture (orchardgrass and plantain)

Parent Material: Greywacke sandstone

Drainage: Well

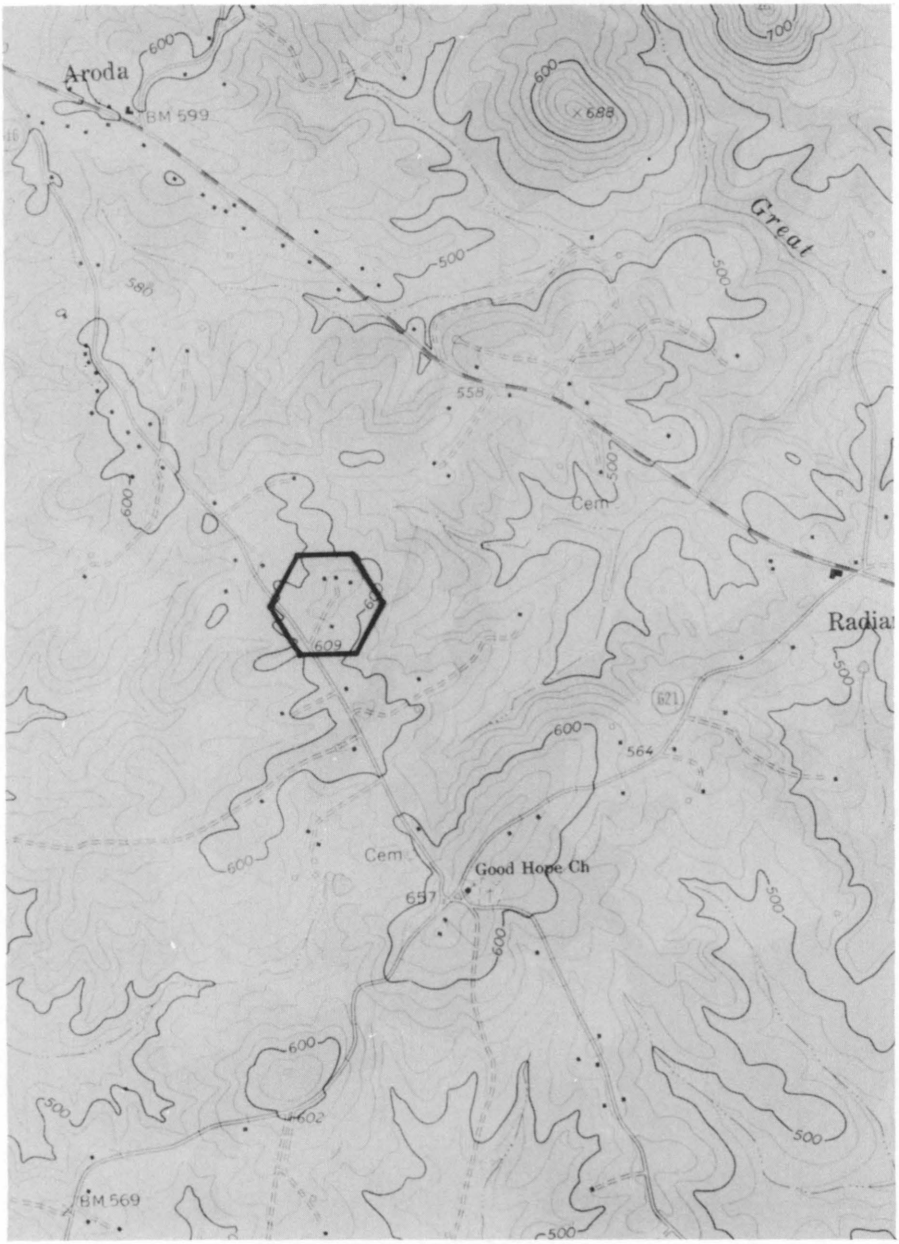
Classification: Typic Hapludult, clayey, oxidic, mesic

Trip Comments: There are no series for the greywacke sandstone. See comments for Elioak Site 10.

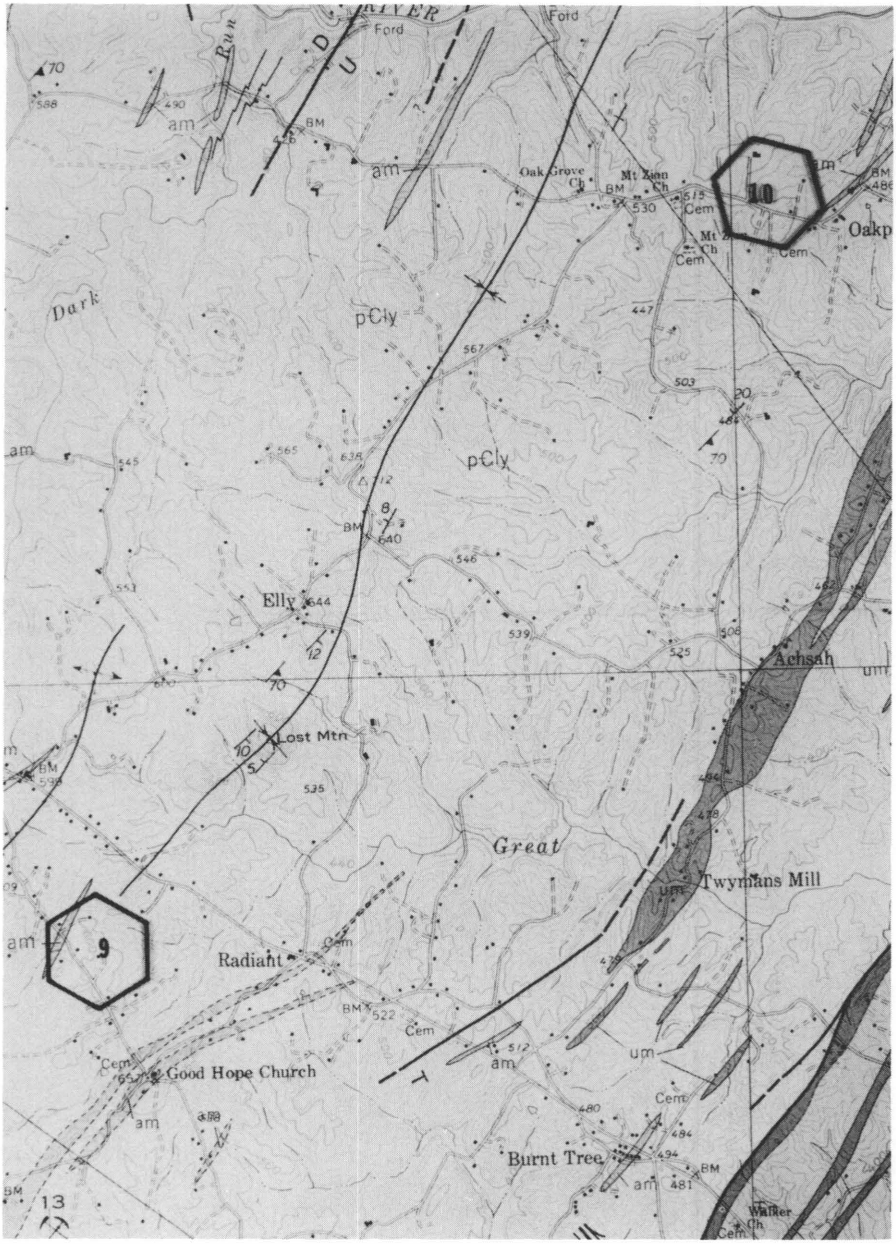


Elioak Site 9. Madison County soil survey.
Map Sheet 38. (1:15,840)

ElB = Elioak fine sandy loam, 2-7% slopes
ElC2 = Elioak fine sandy loam, 7-15% slopes, eroded
ElD2 = Elioak fine sandy loam, 15-25% slopes, eroded
HaD = Hazel loam, 7-15% slopes
MvB = Meadowville loam, 2-7% slopes



Elioak Site 9. Madison County.
Topographic map (1:24,000)
Madison Mills quadrangle.



Elioak Sites 9 and 10. Madison County Geologic Map. (1:62,500)

pCly = Lynchburg formation
um = Ultramafics
am = Amphiobolites

PROFILE 1 (E9-1)

Ap--0 to 24 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz; common, fine mica flakes.

B2t--24 to 93 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; many, fine mica flakes.

C--93 to 162 cm, red (2.5YR 4/6) sandy clay loam; common, fine and coarse, distinct mottles of yellowish brown (10YR 5/8); structureless massive; friable, slightly sticky, slightly plastic; very many, fine mica flakes.

PROFILE 2 (E9-2)

Ap--0 to 24 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 10% angular fragments of quartz; common, fine mica flakes.

B2t--24 to 88 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; many, fine mica flakes.

C--88 to 165 cm; red (2.5YR 4/6) sandy clay loam; common, medium, distinct mottles of brownish yellow (10YR 6/8); structureless massive; friable, slightly sticky, slightly plastic; very many, fine mica flakes.

PROFILE 3 (E9-3)

Ap--0 to 18 cm, light yellowish brown (10YR 6/4) loam; weak, fine, granular structure; friable; slightly sticky, slightly plastic; 5 to 10% angular fragments of quartz; common, fine mica flakes.

B2t--18 to 105 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, plastic; thin, continuous clay films; many, fine mica flakes.

C--105 to 165 cm, red (2.5YR 4/6) and yellowish brown (10YR 6/8) sandy clay loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

Elioak Site 9

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
				E9-1					
A	5.81	2.89	0.36	0.31	5.20	0.15	3.56	8.76	40.64
B	4.75	1.23	0.93	0.28	12.20	3.85	2.44	14.64	16.67
C	4.58	0.19	0.31	0.17	8.20	3.25	0.67	8.87	7.55
Co.Se.	5.27	0.26	0.24	0.10	8.20	2.55	0.60	8.80	6.82
				E9-2					
A	5.36	2.01	0.19	0.18	5.60	0.45	2.38	7.98	29.82
B	4.76	1.07	0.92	0.21	13.00	3.65	2.20	15.20	14.47
C	4.65	0.10	0.21	0.14	8.20	4.45	0.45	8.65	5.20
Co.Se.	4.80	0.14	0.09	0.08	6.20	2.25	0.31	6.51	4.76
				E9-3					
A	6.52	4.06	0.50	0.38	3.40	0.05	4.94	8.34	59.23
B	4.72	0.37	0.71	0.14	11.80	2.95	1.22	13.02	9.37
C	4.58	0.18	0.27	0.17	8.00	2.75	0.62	8.62	7.19
Co.Se.	4.83	0.22	0.19	0.09	5.60	1.55	0.50	6.10	8.20

Elioak Site 9

Horizon	Sand VC	C	M	F	VF	Total	Silt	Clay	Textural Class
	percent								
				E9-1					
A	3.3	6.9	12.0	16.9	10.8	49.9	35.3	14.8	l
Co.Se.	0.9	2.1	4.4	9.6	9.5	26.6	14.2	59.2	c
C	5.0	9.2	9.0	16.5	17.5	57.3	17.2	25.5	scl
				E9-2					
A	3.3	7.5	12.8	16.1	9.1	48.8	35.5	15.7	l
Co.Se.	2.4	4.2	5.2	6.9	8.6	27.3	13.0	59.8	c
C	3.5	5.2	7.1	15.7	24.7	56.2	23.7	20.1	scl-sl
				E9-3					
A	5.1	6.8	11.1	16.3	8.8	48.1	36.0	15.9	l
Co.Se.	3.7	4.7	6.1	7.8	9.3	31.6	10.1	58.3	c
C	4.9	7.9	7.2	18.8	25.7	64.5	16.5	19.1	sl-scl

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	percent						
E9-1	40	29	16	12	1	1	1
E9-2	56	24	9	9	--	2	--
E9-3	54	24	6	8	2	6	--
E9-1(C)	38	29	8	23	--	1	1

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	percent				
E9-1	21	--	60	20	--
E9-2	38	--	47	15	--
E9-3	7	9	29	45	10

Clay Mineralogy

Pro-file	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	percent							
E9-1	5	3	63	5	20	4	--	--
E9-2	3	5	55	5	29	3	--	--
E9-3	3	4	68	--	22	3	--	--
E9-1(C)	Tr	Tr	77	Tr	21	2	--	Tr

Whole Soil Mineralogy

Pro-file	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mont.
	percent									
E9-1	16.6	7.7	17.8	40.1	3.0	11.8	2.4	0.3	0.3	---
E9-2	22.0	6.6	14.1	34.9	3.0	17.3	1.8	0.7	---	---
E9-3	19.5	8.5	9.6	44.1	1.0	12.8	1.7	1.9	---	---

Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
E9-1	15.1	4.6	0.30
E9-2	14.6	2.8	0.27
E9-3	13.1	2.1	0.25

Elioak Site 10

Location: Madison County, Virginia, 2000 ft. ESE of Mt. Zion Chruch on Rt. 634; 250 ft. S of Rt. 634, 2500 ft. SW of Rts. 618 and 634.

Elevation: 500 ft.

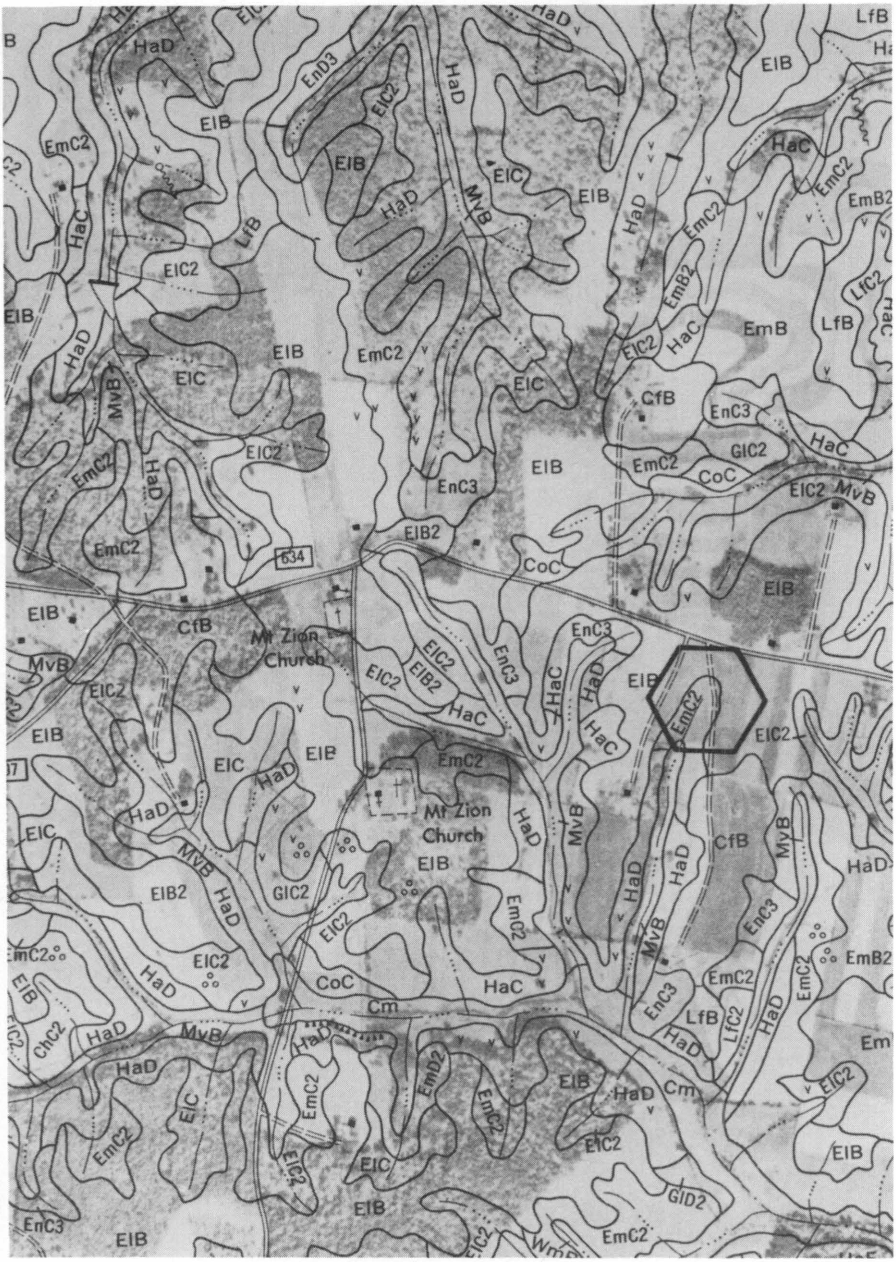
Vegetation: Cropped (fallow)

Parent Material: Graywacke sandstone

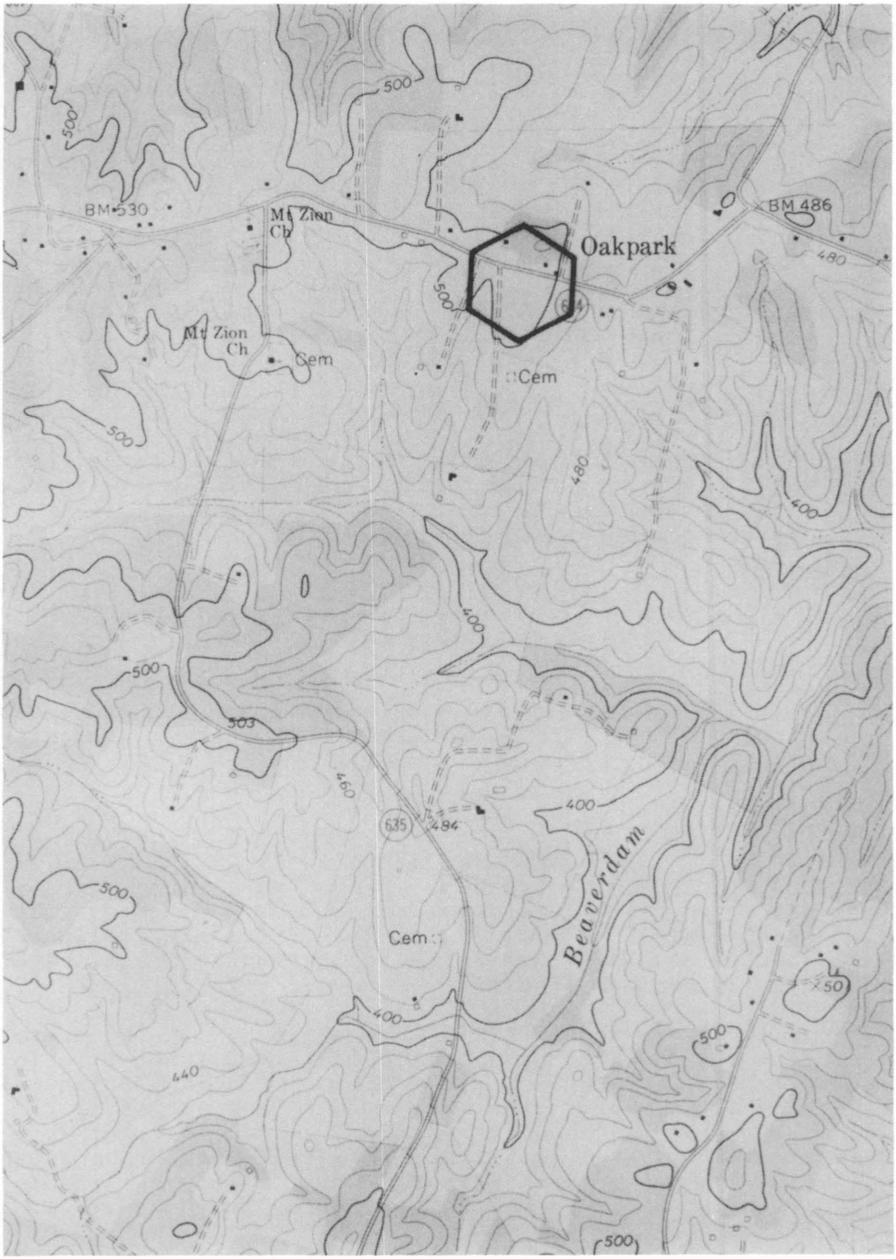
Drainage: Well

Classification: Typic Hapludult, clayey (fine loamy), oxidic, mesic

Trip Comments: Near the Cullen concept, but does not fit the parent material criteria for that series. More friable than the Lloyd series concept. Greywacke sandstones varies widely from basic to acidic rocks. A series is needed for the greywackes.



Elioak Site 10. Madison County soil survey.
Map sheet 29. (1:15,840)
ElB = Elioak fine sandy loam, 2-7% slopes
ElC2 = Elioak fine sandy loam, 7-15% slopes, eroded
EmB = Elioak loam, 2-7% slopes
CfB = Cecil fine sandy loam, very deep, 2-7% slopes



Elioak Site 10. Madison County.
Topographic map (1:24,000)
Madison Mills quadrangle.

PROFILE 1 (E10-1)

Ap--0 to 25 cm, light yellowish brown (10YR 6/4) sandy loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 2 to 5% angular fragments of quartz; common, fine mica flakes.

B2t--25 to 100 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thin, patchy clay films; many, fine mica flakes.

C--100 to 160 cm, red (2.5YR 4/6) sandy loam; structureless massive; very friable, slightly sticky, slightly plastic; many, fine mica flakes.

PROFILE 2 (E10-2)

Ap--0 to 22 cm, light yellowish brown (10YR 6/4) sandy loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 2 to 5% angular fragments of quartz; common, fine mica flakes.

B2t--22 to 105 cm, red (2.5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thin, patchy clay films; many, fine mica flakes.

C--105 to 143 cm, red (2.5YR 4/6) sandy loam; structureless massive; very friable, slightly sticky, slightly plastic; many, fine mica flakes.

R--143+ cm

PROFILE 3 (E10-3)

Ap--0 to 25 cm, light yellowish brown (10YR 6/4) sandy loam; weak, fine, granular structure; friable, slightly sticky, slightly plastic; 2 to 5% angular fragments of quartz; common, fine mica flakes.

B2t--25 to 89 cm, red (2.5YR 4/6) sandy clay loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thin, continuous clay films; many, fine mica flakes.

C--89 to 122 cm, red (2.5YR 4./6) to yellowish brown (10YR 5/8) sandy loam; structureless massive; friable, slightly sticky, slightly plastic; many, fine mica flakes.

Elioak Site 10

Horizon	pH	Ca	Mg	K	H	Al	Sub-Total	Total	Base Sat.
		meq/100g							%
					E10-1				
A	6.24	0.35	0.95	0.25	4.60	0.05	4.55	9.15	49.73
B	5.44	1.84	1.41	0.22	9.60	0.75	3.47	13.07	26.55
C	4.79	0.19	0.36	0.29	8.60	1.15	0.84	9.44	8.90
Co.Se.	5.06	0.16	0.12	0.21	4.60	0.85	0.49	5.09	9.63
					E10-2				
A	6.63	3.82	1.15	0.46	5.00	0.05	5.43	10.43	52.06
B	5.45	2.56	1.22	0.19	10.20	0.55	3.97	14.17	28.02
C	4.71	0.14	0.26	0.28	9.00	1.25	0.68	9.68	7.02
Co.Se.	4.96	0.12	0.11	0.20	5.40	0.80	0.43	5.83	7.38
					E10-3				
A	6.37	3.02	0.78	0.25	6.00	0.05	4.05	10.05	40.30
B	5.93	2.84	1.21	0.16	9.20	0.45	4.21	13.41	31.39
C	5.07	0.86	0.64	0.21	8.80	0.75	1.71	10.51	16.27
Co.Se.	5.21	0.94	0.77	0.18	7.20	0.75	1.89	9.09	20.79

Elioak Site 10

Horizon	Sand VC	Sand C	Sand M	Sand F	Sand VF	Total	Silt	Clay	Textural Class
	percent								
					E10-1				
A	4.9	10.2	13.4	17.5	9.8	55.9	26.2	17.9	sl
Co.Se.	3.2	6.0	8.4	11.9	8.3	37.7	16.0	46.3	c
C	5.2	12.2	13.2	22.3	19.7	72.6	16.9	10.5	sl
					E10-2				
A	3.0	8.5	14.3	19.6	9.2	54.6	30.9	14.5	sl
Co.Se.	2.9	5.9	9.1	12.2	9.8	39.8	18.0	42.2	c
C	6.3	14.3	26.4	19.7	3.9	70.6	12.1	17.2	sl
					E10-3				
A	4.1	9.1	13.6	19.9	10.1	56.9	29.4	13.7	sl
Co.Se.	4.5	7.3	10.5	14.3	10.9	47.5	20.1	32.4	scl
C	5.3	22.1	29.4	14.0	2.5	73.4	11.2	15.4	sl

Sand Mineralogy

Profile	Qtz.	Fldsp.	Muscov.	Biotite	Heavy Miner.	Opaque	Rock Frag.
	-----	-----	-----	percent	-----	-----	-----
E10-1	57	33	3	3	--	3	1
E10-2	62	30	3	3	Tr	--	2
E10-3	57	32	3	5	--	2	1
E10-1(C)	85	2	3	9	--	1	--

Silt Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.
	-----	-----	percent	-----	-----
E10-1	23	3	52	3	19
E10-2	47	2	41	--	10
E10-3	19	6	55	2	18

Clay Mineralogy

Profile	Qtz.	Mica.	Kaol.	Verm.	Hyd-in Verm.	Gibb.	Mont.	Fldsp.
	-----	-----	-----	percent	-----	-----	-----	-----
E10-1	10	5	42	--	34	9	--	--
E10-2	8	5	42	--	36	9	--	--
E10-3	8	3	40	6	35	8	--	--
E10-1(C)	Tr	5	50	5	20	11	--	Tr

Whole Soil Mineralogy

Profile	Qtz.	Fldsp.	Mica	Kaol.	Verm.	Hyd-in Verm	Gibb.	Opaq.	Rock Frag	Mon
	-----	-----	-----	-----	percent	-----	-----	-----	-----	-----
E10-1	29.8	12.9	12.8	19.9	3.0	15.7	4.2	1.1	0.4	--
E10-2	36.6	12.3	11.9	17.7	1.8	15.2	3.8	---	0.8	--
E10-3	33.5	16.4	15.9	13.4	5.5	11.3	2.6	1.0	0.5	--

Elioak Free Iron, Whole Soil Aluminum, and Oxidic Ratio

Profile	Free Fe Oxides	Whole Soil Al	Oxidic Ratio
	%	meq/100g	
E10-1	11.7	3.0	0.34
E10-2	10.9	2.5	0.35
E10-3	8.0	4.9	0.33