A study of data from soil survey characterization projects across Tennessee revealed unexpected chemical properties of soils in fields used for long-term agriculture. We found that these intensely managed soils have elevated levels of exchangeable Ca and Mg (high base saturation) deep in the profile (1.5–2 m) relative to their presumed natural condition. These unexpected properties cannot be accounted for in the parent material or other features identifiable in the field and are believed to be the result of long-term agricultural management, particularly additions of lime.

The soils discussed here were sampled as representing soil series that are naturally acid (Hapludults and Paleudults). Our conclusion that soil properties have been affected by agricultural management is consistent with research indicating that vertical translocation of Ca and Mg can occur readily in naturally acid soils, affecting soil properties (e.g., base saturation in Ultisols) to a considerable depth (Buol and Stokes, 1997; Buol, 1995). These changes in chemistry are sufficient to change the soil’s taxonomic class at the subgroup or order level. In our study, the intensely managed soils have characteristics of Alfisols rather than Ultisols (Soil Survey Staff, 1999). Fanning and Fanning (1989) referred to “cultural Alfisols,” i.e., soils whose pH and base status have been changed throughout the profile by long-term application of surface amendments, particularly lime. They mentioned that historically these changes have been recognized in Ap horizons or near-surface layers, but that alterations are not confined to surface layers when applied for a period of many years.

Our objective in this study was to compare a soil that has been altered by management (i.e., liming) with a native, unaltered soil representative of the named soil series. We considered the question of how to address these soils in the series framework when their extent is limited, perhaps to individual farm fields. Small areas of soils having differing properties and classification typically have been mapped as inclusions to a named series due to their limited extent. We suggest that with supporting data, this type of included soil could be appropriately recognized in the official soil series description (OSD).

**Method and Background**

Three soils were selected to compare an affected soil (termed herein as inclusion) with a soil representative of the named soil series (termed typical). Field studies, soil descriptions, sampling, and laboratory characterization were according to standard methods and procedures (Burt, 2004; Soil Survey Staff, 1993, 2002). Selected soils belong to the Shady, Pickwick, and Waynesboro series. Figure 1 shows the locations of Tennessee counties where the soils were sampled.

Our study is based on a review of existing data and does not use paired or morphologically matched pedons from the same site. Our paired