
Clay Minerals in Pennsylvania Soils* Relation to Lithology of the Parent Rock and Other Factors—I

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Abstract: Clay mineral data have been obtained on 348 soil profiles representing 117 different soil series from 28 of Pennsylvania's 67 counties. The surface rock from which the soils were formed ranged from Pre-Cambrian to Tertiary-Pliocene and includes igneous, metamorphic and various types of sedimentary rocks. Major attention was focused on the subsoil mineralogy. Mica was found to be the most predominant clay mineral in terms of amounts and frequency of occurrence. It is dominant or co-dominant in 82 per cent of the profiles. In shale derived soils it is important in 95 per cent of the cases and in 68 per cent of the limestone soils. Kaolinite is a prominent component of soils derived from sandstone and metamorphic rocks. Montmorillonite was detected in over half of the soils but is very infrequently a prominent component and is more frequently found in the poorly drained soils. A mica-kaolinite suite is characteristic of soils from Pennsylvanian age rock whereas soils derived from Devonian, Mississippian, and Ordovician age rock had a mica-chlorite suite. The chlorite is frequently found weathered to chlorite-vermiculite in a 1:1 ratio. Gibbsite, talc, and pyrophyllite have been identified but only rarely occur. A difference in clay mineral types is frequently found among different profiles of the same soil series. Soils derived from limestone and highly calcareous rock may have rather unusual clay suites such as the dominance of a well-crystallized trioctahedral chlorite, well crystallized mica, and soils approaching a monominerallic character in mica.

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