Search for Kandic Horizons in the Southern Coastal Plain of Mississippi

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Kandic horizons have been adopted as new diagnostic subsurface B horizons. The proposal originated from the International Committee on Classification of Soils of Low Activity Clays following several years deliberation on the subject. The committee proposed a new diagnostic subsurface horizon, the kandic horizon, and new Great Groups of Alfisols and Ultisols.

The kandic horizon is a clay enriched B horizon similar to the argillic horizon with an effective cation exchange capacity (ECEC) < 12 meq/100 g of clay (sum of bases plus KCl-extractable Al), or with a CEC < 16 meq/100 g of clay (by NH₄OAc at pH 7). The clay percentage increase requirement is not the same as that required for the argillic horizon. Kandic horizons recognize highly weathered clays of low activity which are dominated by 1:1 layered clay minerals such as kaolinite.

The SCS South National Technical Center estimated the extent of low activity clay (LAC) soils in the USA that may have kandic horizons based upon the existing data base. Preliminary estimates projected that 15 to 65% of the Southern Coastal Plain Major Land Resource Area-MLRA 133A (USDA, 1981) may be comprised of LAC soils (Fig. 1).

This study was undertaken to determine the possible occurrence of LAC soils in the highly weathered coastal plain region (MLRA 133A) of south Mississippi.

Materials and Methods

Six pedons on stable, highly weathered landscapes of the Southern Coastal Plain (MLRA 133A) were described and sampled in Stone and Pearl River Counties (Fig. 1) using standard methods. The area has an average annual precipitation of 1400 to 1500 mm and is located in the upper part of the thermic soil temperature regime (15–22 °C). The selected soils were considered likely candidates for kandic horizons. The soils were Paleudults on level landscapes, and three of the series were plinthic, reflecting extreme weathering (Table 1).

Samples were air-dried and sieved to remove coarse fragments (>2 mm). Particle-size distribution was determined by the hydrometer method (Day, 1965) and sieving. The clay fraction was separated by sieving and centrifugal sedimentation. The clay fraction was analyzed via x-ray diffraction with a Norelco Geiger counter spectrophotometer using Cu Kα radiation and a Ni filter. Mineral type and content were estimated from the basal spacings and x-ray peak intensities.

Exchangeable cations extracted with 1 N NH₄OAc were determined by atomic absorption spectrophotometry. Extractable acidity was determined by the barium chloride-triethanolamine method (Peech, 1965). Exchangeable aluminum was extracted with 1 N KCl and determined by titration (Yaun, 1959). Iron oxides were extracted with sodium dithionite-citrate-bicarbonate and determined by titration (Mehra and Jackson, 1960). Cation exchange capacity of the clay fraction was

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