

Mineralogy Class of Indian Cracking Clay Soils (Vertisols and intergrades) in the US Soil Taxonomy: A Critical Appraisal

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Abstract: *Soil Taxonomy (USDA) places cracking clay soils (CCS) (Vertisols and vertic intergrades) into the smectitic mineralogy class. Smectite is a group name consisting of montmorillonite, beidellite and nontronite. Numerous studies, especially undertaken at the ICAR-NBSS&LUP, Nagpur over the last few decades, established that the layer charge of smectites in reality reflect that of specimen bentonite (montmorillonite). Therefore, it would be prudent to revise the mineralogy class of the CCS as 'montmorillonitic' instead of the present class as 'smectitic'. The presence of palygorskite as one of the other minerals, is quite common in the Deccan Basalt derived alluvial parent materials of the CCS. Despite the problem in identification of small amounts of this mineral by X-ray diffraction analysis, simple method, based on the unique depth distribution of exchangeable Ca, Mg, Na, Ca/Mg, and base saturation ≥ 100 , is in place to ascertain its presence. Remarkable reduction in hydraulic properties in the subsoils, observed due to the presence of palygorskite, is expected to impair the productivity of the CCS under rain-fed conditions of the semi-arid climates (SAT). This important edaphological issue can be well highlighted if the mineralogy class of the CCS containing palygorskite is revised as 'montmorillonitic-palygorskitic' instead of only 'montmorillonitic'. Such revision will help pedologists/soil mappers to guide the SAT farming communities to raise agricultural crops. This critical appraisal is prepared for its acceptance in the US Soil Taxonomy, which is a dynamic and an open-ended system, and has provision to accommodate any new concepts developed over time through concerted global research efforts to make the system more rational, understandable and meaningful for the soils of tropical India.*

Keywords: *Deccan Basalt alluvium; Indian Vertisols and vertic intergrades; Montmorillonitic mineralogy class; montmorillonitic-palygorskitic mineralogy class.*