



**RIO18**  
21st World Congress  
of Soil Science

**21 WORLD CONGRESS OF SOIL SCIENCE**  
Sunday 12 – Friday 17 August 2018  
Rio de Janeiro, Brazil

Rio de Janeiro August | 12 - 17

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### **Geotechnical characterization of Vertisols from Bahia State, Brazil**

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Despite the existence of vertic soils with predominance of kaolinite is reported around the world, there are few studies shown the influence of this clay mineral in their geotechnical characteristics. The work aimed to perform a geotechnical characterization of Vertisols from Bahia, Brazil, besides understanding the influence of physical, chemical and mineralogical properties on the geotechnical behavior. Three Vertisols were collected in Juazeiro city, in a semi-arid region, one kaolinitic Vertisol and two smectite Vertisols. Other three Vertisols were collected in Recôncavo region, all presented clay mineralogy with codominance of smectite and kaolinite (Sm-K). A geotechnical characterization was carried out in their diagnostic horizons, determining properties such as granulometric curve, clay activity, linear expansion coefficient, compaction capacity, cohesion ( $c'$ ), and internal friction angle ( $\phi$ ) of saturated soils. We observed that the clay content was the attribute that most influenced the geotechnical characteristics. All soils showed expansion potential above 0.01, considered as very high. The kaolinitic Vertisol showed the lowest clay activity. However, the clay content of 68% contributed to this soil to present an expansion potential similar to the smectite Vertisol with clay content of 35%. The major values of soil compaction were observed for the kaolinitic Vertisol, which presented greater reduction of void ratio and higher density as a function of moisture increase. For this soil, the optimal moisture content (OMC) and maximum dry density (MDD) were 22% and 1.65 g cm<sup>-3</sup>, respectively. The other soils presented OMC between 18-41% and MDD between 1.75-1.24 g cm<sup>-3</sup>. These smectite-soils, MDD decreased with increasing of OMC. All soils had low  $c'$  values, which is expected for high clay content soils. The  $c'$  values increased with increasing of kaolinite and decreased with increasing of clay content. The kaolinite Vertisol showed  $c'$  of 0.19 kgf cm<sup>-2</sup>. The  $c'$  values to Sm-K Vertisols ranged between 0.05-0.11 kgf cm<sup>-2</sup>. As for smectite-soil,  $c'$  values ranged between 0.02-0.03 kgf cm<sup>-2</sup>. Low  $\phi$  values were observed for all soils, which indicates low shear resistance. In its turn,  $\phi$  was more influenced by granulometry, in which higher levels of sand and gravel provided higher  $\phi$ , independently of the type of clay. Vertisols with different mineralogy present different geotechnical characteristics.

**Keywords:** Smectite; kaolinite; expansive soils

**Financial Support:** Departamento Nacional de Infraestrutura de Transportes - DNIT; Conselho Nacional de Desenvolvimento Científico e Tecnológico - CNPq



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