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Physical indicators of soil quality on management systems from Cerrado Region in Minas Gerais State, Brazil. M.L.N. Silva, N. Curi, Universidade Federal de Lavras, D.E. Stott, USDA-ARS National Soil Erosion Research Lab, West Lafayette, IN USA, A.N. Beutler, Universidade Federal de Lavras, J.C. Cruz, and I.A. Pereira Filho, Empresa Brasileira de Pesquisa Agropecuária – Centro Nacional de Pesquisa de Milho e Sorgo (Embrapa-CNPMS), Sete Lagoas, Minas Gerais, Brasil.

The soil is a natural resource important to tropical ecosystems. Various forms of soil degradation can occur over time if management is inadequate. The direct consequences of soil degradation are erosion, productivity reduction, and loss of ecosystem sustainability. The use of physical indicators of soil quality is an important strategy for evaluation of sustainability of management systems. This study aimed to use soil phusical characteristics to assess the soil resource placed under management systems commonly used in the cerrado region. The study was conducted at the EMBRAPA-CNPMS station in Sete Lagoas, Minas Gerais, Brazil. The regional climate is considered to be savanna seasonal tropical, or type Aw (Köppen). The soil is an allic, very clayey texture, with gentle undulated relief. It is classified as a Dark-Red Latosol in the Brazilian soil taxonomic system, or as an Acrustox in the U.S. system. The native vegetation is semideciduous tropical cerrado. The management systems studied were: conventional till with disk plow, conventional till with harrow, and no-till under continuons cultivation with corn, and conventional till with disk plow, and no-till corn and bean rotation. A site remaining under the native cerrado was included for comparison. The sites had been under the current management systems for 6 years. Values for the geometric average diameter ranged from 1.94 to 4.42 mm. The penetration resistance ranged from 0.56 to 4.92 MPa, and permeability measurements were 4.6 to 115.0 mm h-1. The higher values for penetration resistance were registered in the 20 to 30 cm depth. The organic matter content had a significant positive correlation ($P < 0.05$) with the geometric average diameter ($r = 0.95$) and permeability ($r = 0.96$), and a negative correlation with the penetration resistance ($r = -0.92$). Based on this study, it was concluded that no till management resulted in bigger, more resistant and more porous aggregates. This was probably due to the increased organic matter in the no-till. The no-till sites however also exhibited more penetration resistance and lower permeability than the other systems. This is probably due to winter dry period, difficulty in building-up a crop residue layer at the soil surface.

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