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Pore size distribution of a deeply excavated Oxisol after 19 years reclamation

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Digging of the local soil and using it as a raw material for construction purposes has been identified as a non-negligible source of land degradation. Techniques aimed at soil profile reconstruction and ecological restoration of soils truncated by mechanical excavation using heavy machinery have been investigated Both, total soil porosity and pore size distribution are important properties for soil management as well as for assessing the recovery of soil function after land degradation. In this way, macropores are responsible for aeration, whereas water storage depends on soil meso- and micropores in the soil and the optimal pore-size distribution is also an indicator of soil quality. We investigated the changes in the pore size distribution of a soil that was beheaded to extract raw materials after a 19 year period of reclamation, which involved the use of green manures, gypsum and pasture for the purpose of profile recovery. The studied area is located in Mato Grosso do Sul State, Brzil. A field trial was performed following a completely randomized experimental design with seven treatments and four replications. Starting 1992, the initial treatments were: 1) control (tilled bare soil), 2)*Stizolobium aterrium*, 3)*Cajanus cajan*, 4)*lime+S. aterrimum*, 5) lime+C. *cajan*, 6) lime + gypsum + S. *aterrimum*, 7) lime + gypsum+C. *cajan*. In 1994, all treatments with C. cajan were replaced by Canavalia ensiformis and in 1999, Brachiaria decumbens was implanted in all the experimental plots. Data from vegetated treatments were compared with bare soil (control) and native vegetation (Savannah). Soil samples were collected in 2011 at the 0.00-0.10, 0.10-0.20, and 0.20-0.40 m depths. Treatment differences were assessed by analysis of variance, following the Scott-Knott test (5%) of probability to compare averages. Macroporosity of the 0.00-0.10 m top layer was above the 0.10 m^3m^{-3} threshold considered as critical for plant growth. On the 0.10-0.20 m layer only treatments with C. *cajan* later on followed by C. *ensiformis* reached macroporosities over the 0.10 m^3m^{-3} threshold, and on the 0.20-0.40 m no treatment was above this critical value. In spite of the positive development of macroporosity in the restored soil profile, this physical attribute was far from the typical values corresponding to local soils under native Savannah vegetation.