

TN contents in the layers of 0-5, 5-10 and 10-20 cm. The treatments T1 and T7 presented lower TOC (0-5 cm), lower WMD and GAD (0-5 cm) and lower NT (10-20 cm) contents compared to the other onion culture systems. The treatment T8 favors the formation of stable macroaggregates, with higher values of WMD and GAD in depth (10-20 cm). The use of cover crops in winter or summer in the treatments T2, T3, T4, T5, T6 and T8 favors the formation of stable macroaggregates in comparison to treatments T1 and T7, which do not use cover crops in winter and summer.

Keywords: *Allium cepa* L., cover plants, weighted average diameter, plant diversity, no-tillage system

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(1404 - 2061) Ultrasonic energy in the stability of the aggregates of oxidic Oxisols with intensive cultivation and irrigation

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Soil, when subjected to conventional intensive crops, tends to lose its original structure. The objective of this study was to evaluate the stability of aggregates of Red-Yellow Oxisols submitted to long periods of intensive cultivation and irrigation, from the mesoregion of Rio Paranaíba, Minas Gerais, Brazil. Samples of 0.1 to 0.2 m were collected in areas under native vegetation and with horticulture cultivation in different times of use, characterized by the intensive use of machines and implements, inorganic fertilizers, and center-pivot irrigation. The data were analysed using a completely randomized experimental design, arranged in factorial scheme (7x7), corresponding to the times of use (1; 17; 22, 28, 32 and 43 years) + native vegetation (Cerrado) and times of sonication (0; 15; 30; 60; 120; 240; and 480 seconds) with three replicates. First, samples of 5 g of 2-4 mm aggregates were pre-wetted (sprayed) with deionized water and allowed to stand for 2 hours. Subsequently, the samples were transferred to a beaker of 250 mL, completing the beaker with 200 mL of deionized water (soil:water ratio of 1:40). They were then sonicated with ultrasonic probe (Sonics Vibracell, model Ultrasonic processor 750 Watt operating at 20 kHz), applying the calculated energy of 0,0; 3.5; 7.0; 14.0; 28.0 56.0; and 112.0 J mL⁻¹, at the amplitude of 60% and calibrated power of 46.67 W. Finally, the dispersion indices were normalized, and from the relationship between the parameters of the regression equation (b/a) the disaggregation index was calculated. The results were submitted to analysis of variance, with the comparisons between the intensive use by the Scott-Knott test and the sonication times by regression, both at 5% probability. The depletion of the significant interaction indicated that, at each applied energy level, the lowest rates of soil disaggregation were observed under native vegetation (0.13), while in those with only one year of cultivation the highest index was observed (0.33). Meanwhile, cultures of 43, 32 and 28 years presented higher disintegration rates (0.30, 0.27, and 0.28, respectively) when compared to the use times of 17 and 22 years of cultivation (0.19 and 0.24, respectively). The results observed for the first year of cultivation led to the hypothesis that, with a time of use, there is a process of selection of aggregates by the stability, but the results indicated that soil aggregation is being compromised with the time of soil use.

Keywords: Soil structure; applied energy; sonication.

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(9055 - 2999) Use of pedotransfer function to predict field capacity of soils of Pernambuco State, Brazil

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Physical, chemical and mineralogical characteristics of tropical soils influence their hydro-physical behavior, which is different from that of soils of temperate climates. The mineralogy of tropical soils, mainly that of the clay fraction, makes soil texture the dominant factor to define their water retention properties. Clay type is directly related to the specific surface of clay particles, their arrangement and pore distribution. Pernambuco State, located in Northeast region of Brazil, is the study area. In this State, there are many soil profiles that lack information related to field capacity. The objective of this study is to develop pedotransfer function (PTF) to estimate field capacity using physical and chemical analyzes of representative soil profiles from Pernambuco State. Data from 81 profiles comprising 285 horizons were used. PTF were developed by multiple regression techniques, using a forward stepwise procedure to select the best predictor from the proportions of sand (S, g.kg⁻¹), silt (Si, g.kg⁻¹) and clay (C, g.kg⁻¹). The evaluation of adequacy of the PTF was based on the correlation coefficient (r) and Willmott index (d). The obtained PTF was FC (%) = 22.7625030 - 0.02136242S + 0.020114636C. The obtained PTF with r = 0.89 and d = 0.96 indicate its suitability to estimate field capacity using only soil texture. Results also showed that silt content has little influence in water retention of tropical soils, chiefly because of its low values.

Keywords: Soil texture, PTF, tropical soils.

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C2.1.2 - The role of soil physics in water conservation and food security

(5383 - 2302) Are shallow impermeable layers beneficial for vegetation function in the semi-arid zone?

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This work develops upon the idea that - not only should root systems in precipitation limited ecosystems have shallower optimal rooting depths than vegetation types growing where water is more abundant - but also, due to reduced drainage losses, that shallow soils with an impermeable layer should actually be beneficial for vegetation function in water limited situations. Finding support for this hypothesis, we show that, - sampling over 20 sites across the Brazilian Caatinga (a semi-arid dry deciduous forest/shrubland vegetation type) - that sites with shallow impermeable layers (usually 0.5 to 1.0 m deep) typically support much higher vegetation biomass amounts than is found under the same climatic conditions but with no such impermeable layer present. This result is found to be consistent with predictions of ecosystem water use as obtained from a simple plant carbon-investment/water uptake trade-off approach and we would like to suggest, contrary to common assumption, that potentially deeper rooting zones are not always beneficial for