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746-23 Deep Soil Carbon and Nitrogen Stocks in Long-Term No-Till.

Poster Number 458

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Abstract:

No-till is an option to increase soil carbon (C) and nitrogen (N) stocks with benefits to soil quality and environment. The carbon sequestration in conservation tillage is dependent, among other factors, of climate, soil type and time of adoption. This research aim to investigate deep soil carbon (1.2 m) in no-till (NT) and conventional tillage (CT) under two long term experiments (18 and 22 years) with different soil types (Mollisol and Oxisol) and climate conditions (temperate and sub-tropical) from USA and Brazil. The American experiment was located in Manhattan (KS) under Hapludoll with 200 g kg⁻¹ of clay, average annual precipitation is 800 mm, and annual mean temperature is 11.4 °C. The experiment is a split plot with four replications, with tillage systems as main plots and fertilizer treatments as split plots. The Brazilian experiment was located in Cruz Alta (RS) under Oxisol with 510 g kg⁻¹ of clay (kaolinite), average annual precipitation is 1727 mm, and annual mean temperature is 19.2 °C. The experiment is randomized block with three replications, with tillage and cropping systems as treatments. In both experiments soil samples were taken at 0-0.05, 0.05-0.15, 0.15-0.30, 0.30-0.45, 0.45-0.60, 0.60-0.90, and 0.90-1.20 m. Total C and N contents were determined by dry combustion using a C/N Elemental Analyzer. The results of soil C and N were expressed in mass equivalent using soil bulk density. In the Mollisol and Oxisol most of the effect of treatments was neglected by tillage. In the Mollisol, under high mineral fertilization treatments, the NT carbon sequestration rate was 0.70 Mg ha⁻¹ y⁻¹ in relation to CT in 0-1.2 m depth. In the Oxisol, under intensive cropping system, the NT carbon sequestration rate was 0.47 Mg ha⁻¹ y⁻¹ in relation to CT. The nitrogen stocks follow the same trend of soil carbon.

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