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Soil carbon stock and origin in tropical soil under sugar cane management afther deforestation

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Sugar-cane is the most important source of bio-fuel in Brazil and large efforts have been done to increases its productivity. To understand the impact of sugar cane harvest system (green and burned cane) on soil organic dynamic we compared area under native forest vegetation (Atlantic Forest) with an area which approximately 10 years of pasture had been converted to sugar cane in Conceição da Barra municipality, Espírito Santo State, Brazil. Since 1998 the sugar cane have been submitted to these harvest systems and at 2005, we conduced the sampling. Under each treatment a trench was opened and three samples from each different soil layer (0-10; 10-20 and 20-40 cm) were taken for bulk density and analysis of total C and 13C isotopic abundance. The C stocks (for 0-40 cm) and contribution of C derived from forest and pasture/sugar cane areas were calculated. The C stock was equivalent to 3.45 kg m-2 under forest and to 3.19 and 3.08 kg m-2 under sugar cane harvested without fire and using this practice, respectively. After 15 years of sugar cane (plus 10 years pasture) and considering all profile, approximately 33 and 40% of the C derived from graminaceous C4 crops (under management without and with fire). The highest proportion of sugar cane-pasture-derived C were found in a superficial layers (0-20cm): 40% for green cane and 44% to burned cane. We concluded that the introduction of sugar cane after pasture in a Typic Paleudult soil (sandy, kaolinitic, isohyperthermic) decreased soil C stocks, besides evolves green house gas emission when the cane burned.

Keywords: 13C, soil organic matter, carbon dynamic, land use change