

# Water, Food, Energy & Innovation for a Sustainable World

ASA, CSSA, & SSSA International Annual Meetings  
Nov. 3-6, 2013 | Tampa, Florida



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## 12-3 Mechanisms of Soil Carbon Protection in a Tropical Agroecosystem Under Differing Management Practices.

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Soil organic carbon (SOC) protection processes and mechanisms are an important part of the global carbon cycle, which is important for improving our understanding of Climate Change feedback mechanisms. In temperate Mollisols, the formation and stabilization of macro-aggregates, largely induced by biological processes, seems to be the main means of carbon protection (Rice 2013); however this is likely very different in tropical Oxisols. It is hypothesized that organic-mineral and mineral-mineral binding is a more important mechanism of macro aggregation and carbon protection in Oxisols. In this study the aim was to observe carbon-mineral relationships in different soil aggregate size fractions of a tropical Oxisols that have been under different soil management practices. First the soil was separated using water stable aggregate (WSA) separation method into four size fractions and then a number of analyses were performed on the separated WSA. The analyses were: Total organic carbon, organic-bound Fe/Al, amorphous Fe/Al, total Fe/Al, XRD, and dissolved organic carbon. In an analysis of organic C-Iron association; it was found that such associations are more significant under conventionally tilled soils. It may be that Fe and Al preferentially bind to soluble organic compounds, which are possibly more prevalent in conventional tillage. No-till typically has more organic carbon than conventional tilled soils (Lal 2004). Organic-mineral associations decreased under no-till in tropical soils (P value of 0.0075) and this may mean that there is another mechanism responsible for carbon protection and macro-aggregate stability.

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