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Sustainable Intensification (crop-livestock-forest integrated systems) and Impact on Soil Organic Matter Dynamics and Reactivity

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Conservative soil management is a priority in Brazilian agricultural research and technology transfer for farmers. Besides extensive adoption of no-tillage practices in croplands areas, more recently crop-livestock-forest (CLF) integrated production systems are gaining adoption by farmers in all Brazilian regions. In 2016 in a national survey, realized by Consultancy Kleffmann, hired by a public-private organization (Network of Support to Integrated Systems Adoption, with participation of Embrapa) identified 11.5 million of hectares under integrated systems adoption, a surprisingly positive result. The CLF integrated production system is an eligible practice within Brazilian Low Carbon Agriculture Plan, launched by Brazilian Government in 2011, as part of stimulus to Brazilian farmers increase adoption of sustainable practices. SOM stabilization by organo-mineral association, soil aggregation and physical protection of SOM, and biochemical recalcitrance of SOM are concomitant processes that govern SOM dynamic and reactivity in soils. These reactions involve physical, chemical and biological processes with organic compounds inputs from crops, pastures, trees, and yet from animal dejects, creating a challenging environment to be carefully analyzed. In this presentation combination of physical and chemical soil fractionating procedures with several analytical tools, as elemental analysis (CHN), laser-induced fluorescence (LIF), laser-induced breakdown spectroscopy (LIBS), ¹³C NMR and other are being applied in long term field experiments generating information about SOM dynamics and reactivity. First results demonstrated increase on SOM content and decrease of humification degree, after five years of experiments, in sites under crop-livestock forest integrated system compared with conventionally managed pastureland, in a transition region from Atlantic Forest to Savannah vegetation in São Paulo State.

Keywords: soil carbon sequestration, spectroscopic analysis, conservative tillage

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