Soil organic matter management in agriculture

Assessing the potential of the 4per1000 initiative

Book of abstracts

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Can the thermal stability of soil organic matter reflect disturbance and resilience in rubber tree-based agrosystems?

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The capacity of soils to mitigate climate change through carbon sequestration depends on the quantitative but also the qualitative changes in soil organic carbon (SOC). In particular, the stability of SOC has to be considered to evaluate the long-term fate of the soil carbon stocks. The aim of this study was to assess the accurateness of thermal analyzes (Rock-Eval pyrolysis) to monitor the evolution of SOC quality and quantity in different land management situations. Using new I/R diagram (Sebag et al., 2016), dynamics of SOC was assessed in rubber tree-based agrosystems in Thailand. This case study allowed analyzing the changes in SOC properties after land use change (cassava to rubber) and over the ageing of the rubber plantation (up to 25 years). Soil from secondary forest plots were included in the study as a reference of an undisturbed system. While I (contribution of fresh OM) and R indices (global thermal stability) were well correlated in forest soils, our results show a higher I value in cassava field, and increasing R values with rubber plantation age. These results indicate that both SOC stocks and SOC stability increased with the age of plantations. However, R-index in the oldest rubber plantations was lower than in forest. Finally, this study highlights the potential of thermal analyses for monitoring SOC quantity and quality with promising application under the 4‰ initiative.

References

Sebag et al. 2016. Dynamics of soil organic matter based on new Rock-Eval indices. Geoderma 284: 185-203. https://doi.org/10.1016/j.geoderma.2016.08.025