

Soil organic matter management in agriculture

Assessing the potential of the 4per1000 initiative



Book of abstracts

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Development of a new *in situ*, time- and cost-effective indicator to assess the impact of land management on soil organic carbon dynamics

Thoumazeau Alexis^{1,2,3,4*}, Gay Frédéric^{2,3}, Chevallier Tiphaine², Panklang Phantip⁴, Prapatson Polwong⁴, Tivet Florent⁵, Bessou Cécile¹ and Brauman Alain^{2,4}

¹ Systèmes de pérennes, Univ Montpellier, CIRAD, F-34398 Montpellier, France;

² Eco&Sols, Univ Montpellier, CIRAD, INRA, IRD, Montpellier SupAgro, F-34398 Montpellier, France;

³ HRPP, Kasetsart University, 10900 Bangkok, Thailand;

⁴ LMI LUSES, Land Development Department, 10900 Bangkok, Thailand;

⁵ UPR AIDA, Univ Montpellier, CIRAD, F-34398 Montpellier, France.

The proposed 4 per mille initiative aims at assessing soil organic carbon dynamics affected by land management in various and numerous ecosystems. However, assessments based on soil organic carbon dynamics face methodological and experimental shortages. First, SOC assessments may not be sensitive enough to rapid land management changes, due to the long term turnover of SOC (Dignac et al., 2017). Indicators based on soil fractions seems more adapted but this method is strenuous and time consuming and not well adapted for land managers. A new framework was proposed by Hurisso et al., (2016) to assess soil carbon dynamics, linking two indicators of soil carbon fractions (POXC and Basal Soil Respiration). This framework proved to be sensitive to land managements, and may be applied with cost-time-effective indicators in the field. Strictly following this framework, this study presents a first *in situ* application of the POxC and SituResp[®] indicators along a perturbation gradient based on rubber tree cultivation in Thailand. The indicators were applied in five study sites to follow a pedo-climatic gradient and finally resulted in 210 sampling points. A predictive model was then developed to avoid the site-specific calibration step and the model was validated among the literature data. The aggregation of the results at the site-scale proved to provide generalizable conclusions on the soil carbon dynamics, from the conversation of an intensive cash cropping system to various rubber tree stand ages, bounded by natural forest reference. Then, the model, integrating soil properties variables, proved to be robust under the pedo-climatic conditions treated, and validated against literature data. This first *in situ* study and the model developed are promising for the further application of the two indicators in more contrasted contexts. The methods may easily be implemented as a preliminary assessment tool in order to conceptualize new management practices that sustain soil carbon stabilization.

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