Title:

"Biofunctool": a framework to assess the impact of agricultural practices on soil quality based on soil functions

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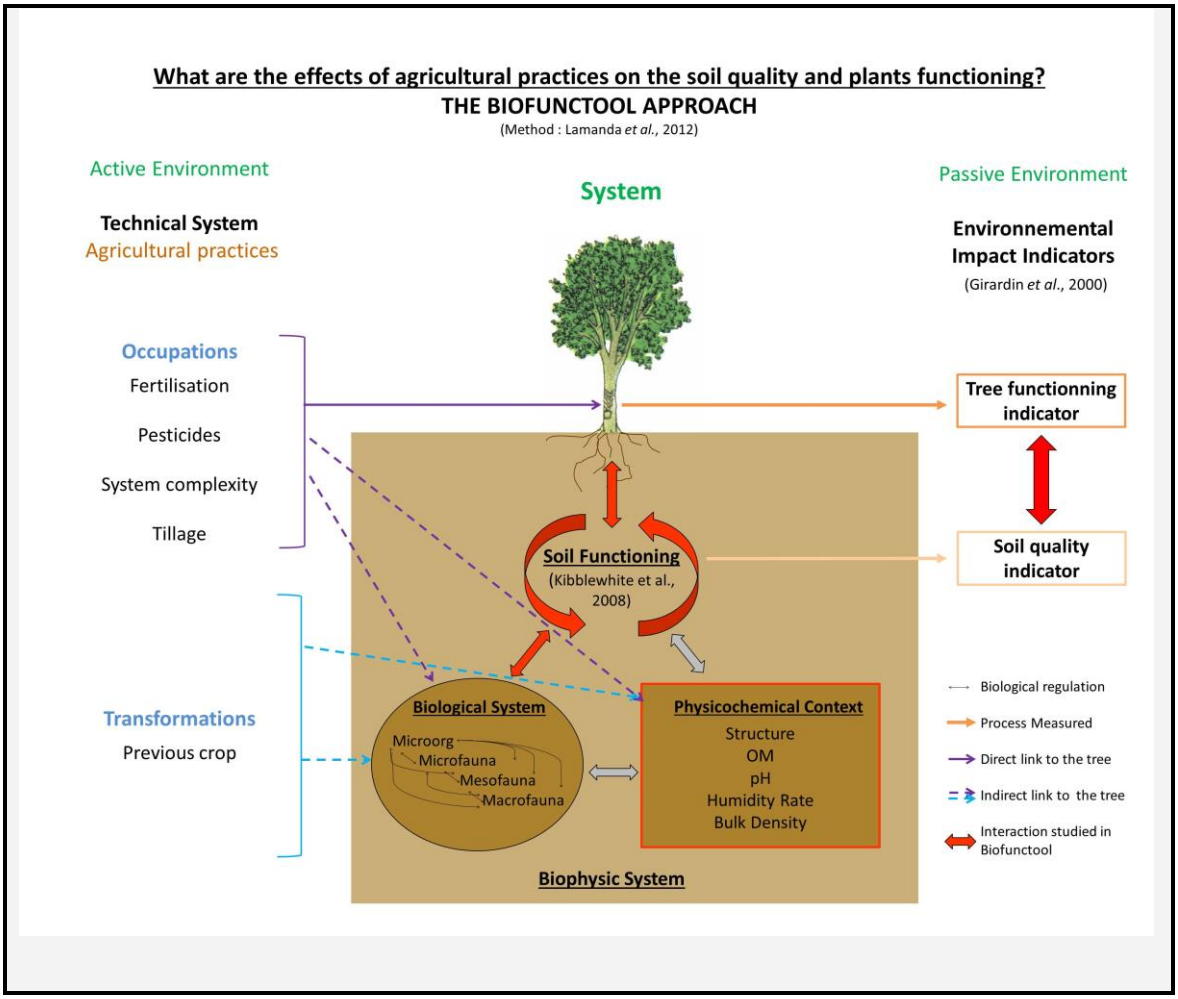
The assessment of soil quality is a concern that has been widely developed in the literature over the last twenty years. According to Karlen *et al.* (1997), the soil quality can be defined as the "the capacity of the soil to function". However, most indicators of the soil quality are based on the evaluation of soil characteristics rather than soil functions. This leads to some discrepancies such as the high productivity of some tropical soils despite their status of "poor soil" conferred by these indicators. Kibblewhite *et al.* (2008) proposed a theoretical framework to study soil functions related to the major ecosystem services. This framework underlines the need to consider the interactions between soil physico-chemical properties and its biological activity. Based on this concept, we aimed at developing a set of functional soil indicators to assess three central soil functions: carbon transformation, nutrient cycling and soil structure maintenance. We intend to integrate all indicators within the "Biofunctool" package, i.e. a set of easy, cost, time-effective *in situ* measurements to assess the soil functions. The Biofunctool package is currently being developed in the context of rubber plantations in Thailand. It will be then tested in a plantation network along a gradient of pedo-climatic and agronomic conditions. In each situation, Biofunctool measurements will be completed with soil biota diagnosis in order to better link soil functions and biological assemblages. The approach and outputs developed will be used to evaluate the impact of agricultural practices on agro-ecosystem performances and sustainability. Biofunctool framework will thus potentially complete existing one, such as the regional agronomic diagnosis (Doré et al., 2008) or the Life Cycle Assessment.


What are the effects of agricultural practices on the soil quality and plants functioning?
THE BIOFUNCTOOL APPROACH
(Method : Lamanda et al., 2012)
Active Environment
Technical System
Agricultural practices
System
Passive Environment
Environnemental Impact Indicators
(Girardin et al., 2000)
Occupations
Fertilisation
Pesticides
System complexity
Tillage
Tree functionning indicator
Soil Functioning
(Kibblewhite et al., 2008)
Soil quality indicator
Transformations
Previous crop
Biological System
Microorg
Microfauna
Mesofauna
Macrofauna
Physicochemical Context
Structure
OM
pH
Humidity Rate
Bulk Density
Biophysic System
Biological regulation
Process Measured
Direct link to the tree
Indirect link to the tree
Interaction studied in Biofunctool