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BIOFUNCTOOL

A multifunctional approach of soil health related to soil biota activities

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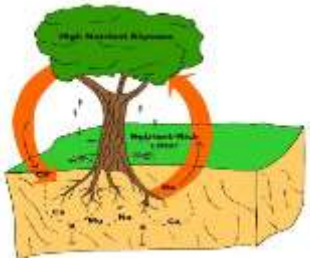
In agricultural system, soil health depends of the maintenance of four major functions provided by soil biota assemblages

Kibblewhite et al., 2008

Carbon transformation

Nutrient cycling

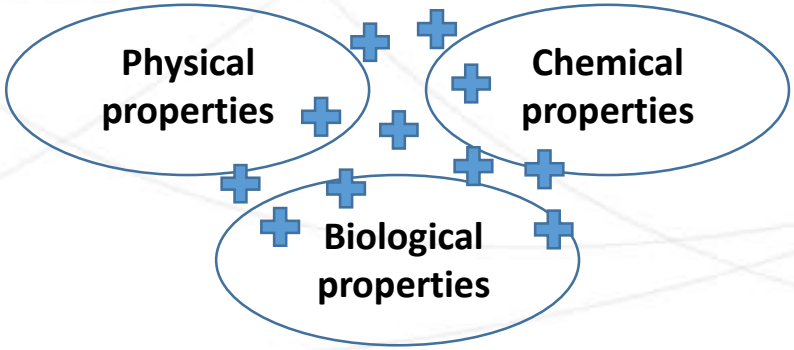


Soil structure

Regulations of pest and disease

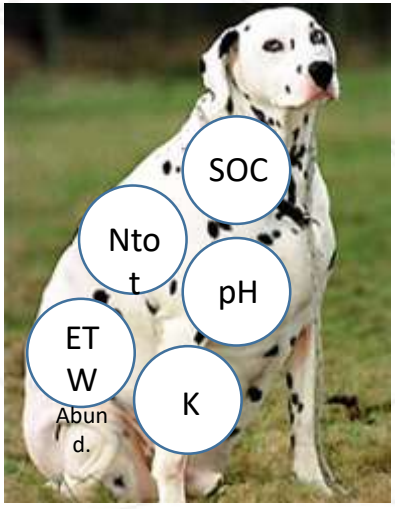
Problem with the current assessment of soil health

« Soil health is the sum of independant components »



A new proposal to assess soil health

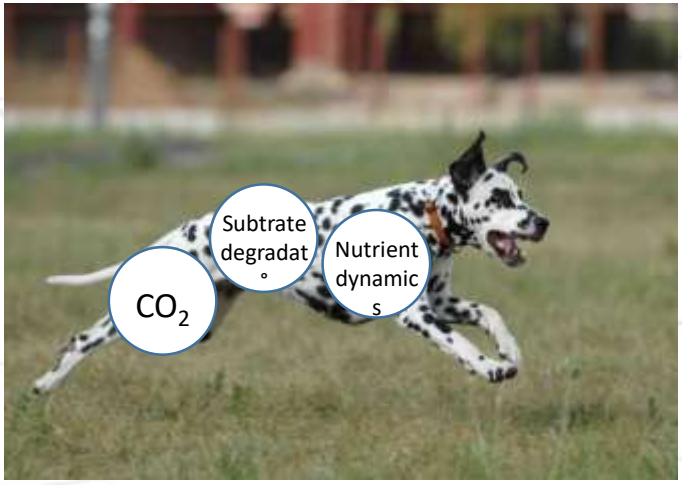
Soil health V1.0



Reductionist approach

Assessment of independant **properties**

Soil health V2.0?



Integrative approach

Assessment of **functions** = result of **interactions**

Our Vision: 3 keys components of soil health assessment

Land managers are the main actors

biodiversity as the man driver of soil functioning

A scoring method based on 3 main soil functions

- **Structure Maintenance (soil erosion**
- **Nutrient Cycling (soil fertility & productivity)**
- **Carbon Transformation (soil carbon storage)**

Through an easy-to-use monitoring tool, Land Managers should be able to evaluate the efficiency of their practices

We target soil functions driven by soil biodiversity rather than measuring it

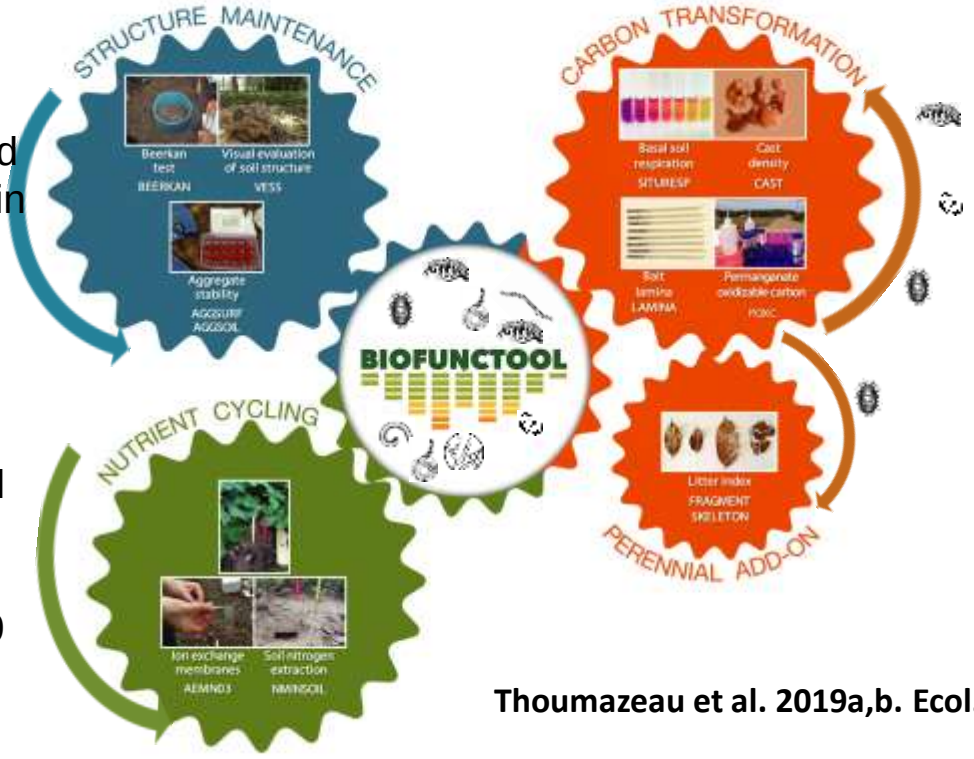
Biofunctool®, a new set of indicators to assess soil biological activities

Low-tech and cost effective indicators

Easy to transfer to land managers, especially in developing countries

In-field indicators

Preserve soil **physical integrity**
Provide immediate results in the field (7/9 of indicators)



Thoumazeau et al. 2019a,b. Ecol. Ind

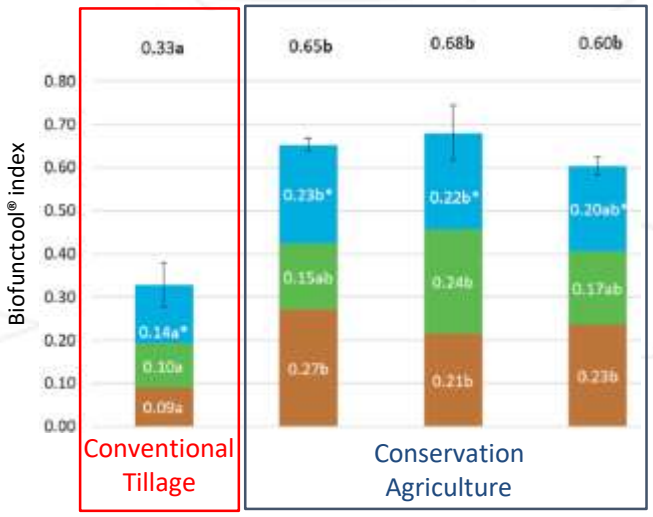
Thoumazeau et al., 2019a.
Thoumazeau et al., 2019b
Pheap et al., 2019
Brauman and Thoumazeau, 2020
Heepngoenand al., 2021

Biofunctool® is adapted to all cropping systems in all pedoclimatic conditions (~10 countries, 3 continents, > 1000 pts

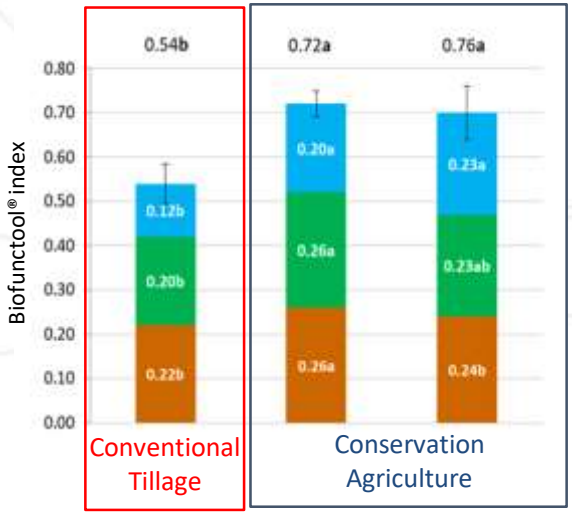
Biofunctool®: assessing the impact of agricultural practices on soil health

COMPARES PRACTICES

CAMBODIA
(Pheap et al., 2019)



NEW CALEDONIA
(Kulagowski et al., submitted)

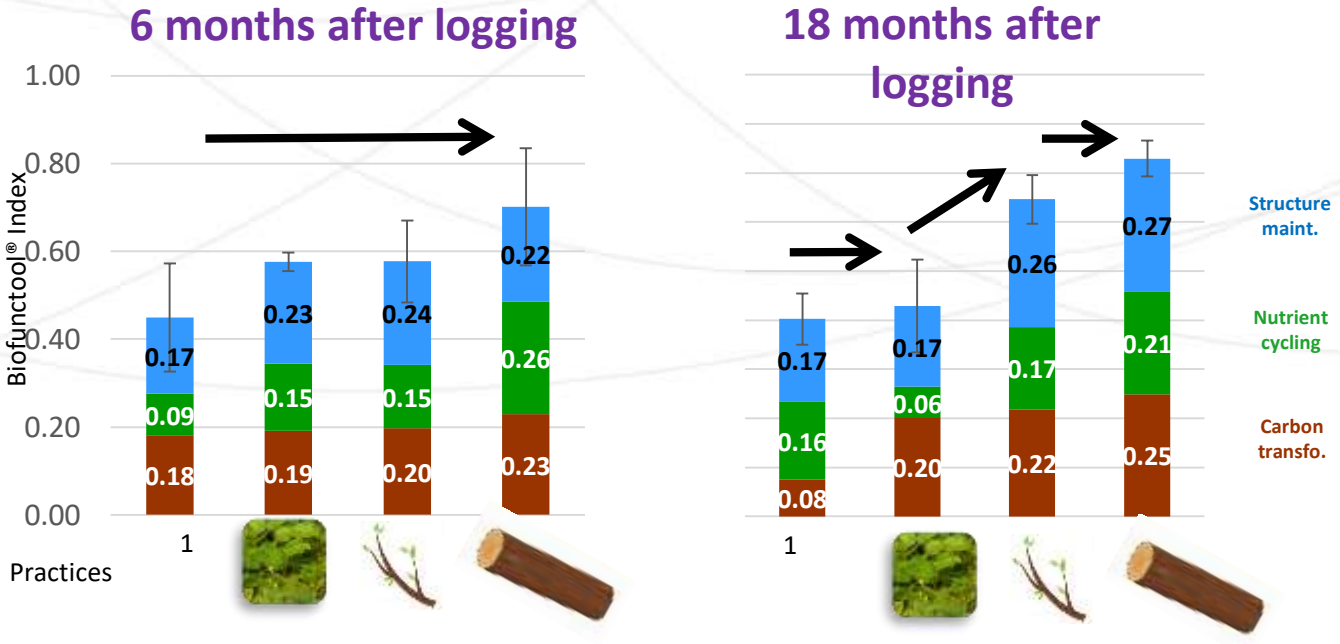


➔ In both studies, the score shows that Conservation Agriculture practices deeply improve soil health

Biofunctool®: assessing the impact of practices on soil health overt time

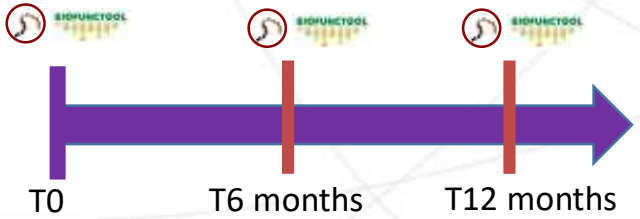
FOLLOWIN G TRANSITIONS

Monitoring the same practices after disturbance (tree logging) over time

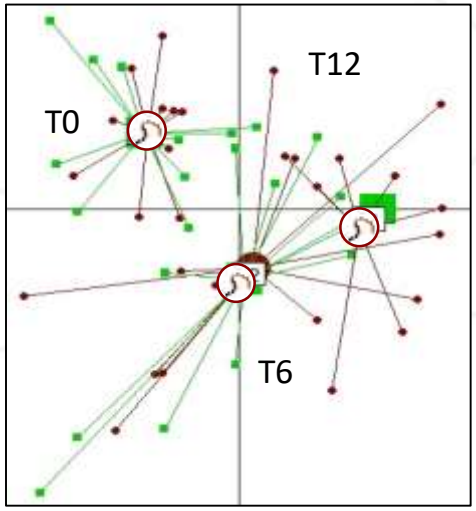


➔ In this study, the score shows a high level of soil health resilience in fields where organic matter was added as logging residues (practice 3 and 4)

Is Biofunctool® related to soil biodiversity ?



Impact of tree logging on soil biodiversity and soil functions (**Biofunctool®**)



Biofunctool®

Macrofauna

Soil functions reflect the evolution of soil biodiversity

Perron and al., submitted

Take home message

Biofunctool® proved to be sensitive to various agricultural practices

Accompanying Land Managers to adopt management practices that improve soil health

Biofunctool® strengthens capacities and autonomy

Enhancing the role of Land Managers for soil health improvement




BIOFUNCTOOL

Thank you for your attention