Investigating farmers' habits and opinions to design an appropriable sustainability diagnosis for Walloon field crop practices

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We want to evaluate the impacts of agricultural practices at the field level

In a network of Walloon farms from the silty region, we analyze the current state of the agroecosystem during a wheat crop, and relate it to the practices applied by the farmer over the past ten years (Figure 1). The state of the field is measured through its provision of various Ecosystem Services (ES).

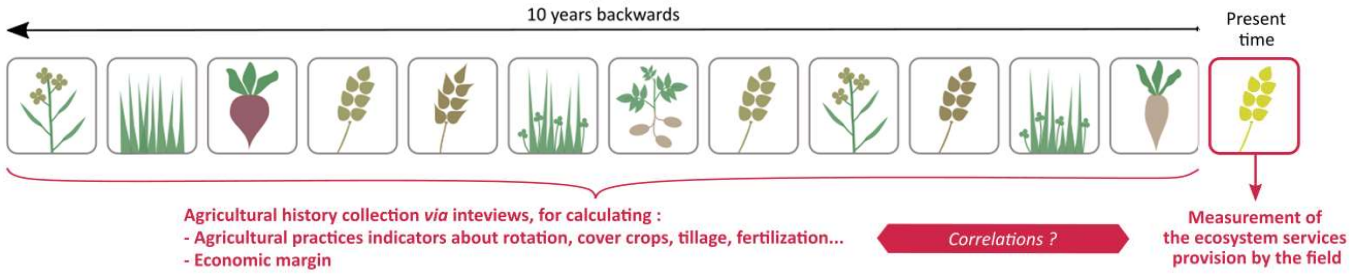

Figure 1. Global study method, combining direct field measurement of ES provision and agricultural history data collection.

We used a participatory method to select ES indicators

Farmers' opinions about the different ES indicators found in the literature were included in the selection process (Figure 2).

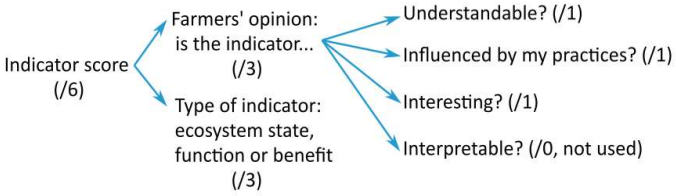

Figure 2. Scoring method for each ES indicator found in the literature.

Opinions were collected from 20 Walloon farmers

We aimed at including the diversity of farming systems of the study region (Figure 3). With these farmers, we carried out one introductory group meeting and then semi-directed individual interviews.

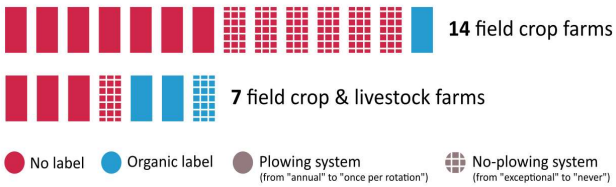

Figure 3. Profiles of the 20 farms included in the study sample

A set of sixteen ES indicators was selected

Multivariate analyses (MCA) showed no significant correlation between the farmers' profile and opinions about the different indicators. Consequently, indicators were selected using mean scores attributed by the farmers sample for each criteria (Table 1).

Table 1. Set of ES indicators selected *via* the participatory method.

Ecosystem Service	Selected indicators
Crop production	- Grain and straw yield
Soil fertility	- Surface organic matter incorporation - Incorporated organic matter decomposition
Soil structural quality	- Soil aggregate stability in water - Soil resistance to compaction - Water infiltration rate - Presence of a surface soil crust
Water quality	- Soil content of potentially leaching nitrogen

Ecosystem Service	Selected indicators
Natural pests and weeds regulation	- Weed seed predation - Weed competitiveness - Presence of diseases on wheat plants
Water availability	- Soil water retention capacity
Climate regulation	- Soil content in labile and stable carbon - Evolution of soil carbon content
Diversity conservation	- Cultivated diversity: species and varieties richness

Key conclusions

- **Opinions on ES indicators were similar**, regardless of cropping systems ;
  - All the interviewees felt that their practices can influence provision of ES ;
  - "Understandability" scores are high for most of the indicators ;
  - Indicators with high scores in "interpretability" are already regularly used in Walloon farms like soil nutrient content, presence of pests or crop yield.
- A supplementary qualitative analysis of the interviews recordings showed that **farmers use many empirical observation methods in everyday life to evaluate various kinds of ES provision by their fields**.

What happened since this first study?

For each indicator, we selected a **measuring method** that is:

- Representative of the field crop unit
- Logistically feasible
- Scientifically rigorous
- Transferable to other case studies

The first **field analysis campaign** started in autumn 2020. Two other campaigns are planned after that.