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Shared Research Questions on Soil Quality in OF

Results of a participatory workshop

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Context: Soils perform a multitude of functions and provide a large panel of ES services → Soils quality maintenance and improvement are key issues and effective levers for development of Organic Farming systems

Objectives: **1.** to identify key research questions to be addressed on soils in OF systems ; **2.** facilitate network/project building from interactions between academics and stakeholders.

Material & Methods:

Town Hall Meeting¹ with 3 successive rounds, each introduced by a question :

1. For you what is a high quality soil (HQS) in OF?
2. Which are the locks to undo to obtain a HQS in OF?
3. Which research questions do we need to answer to undo the locks?

Over 150 participants from large professional backgrounds and diverse systems in Paris (France), 1 full day, Nov. 2018.

- Each question discussed by 15 tables (10 participants + 1 facilitator), validated then transmitted to an expert panel
- Experts gather similar ideas and allow reformulation to take into account nuances > projection on a full screen.
- Participants can react by reinforcing or proposing new ideas.



Table 1. List of questions resulting from the participatory workshop

Soils functioning-Processes and Interactions

1 ¹	How to manage soil contaminants (initial removal and maintenance of quality) and evaluate their effects?
3	What are the relations between biodiversity, soil functioning and ecosystem services?
4	How do soil and climate conditions influence the ability of OF systems to store C? How to assess short term C fluxes?
7	What are the long term impacts of agricultural practices on soils of OF systems and how to evaluate them?
17	What roles does livestock farming play in maintaining soil quality?
19	To what extent does research on OF contribute to other types of farming systems?
20	How to make a root happy?

References, tools and techniques to assess and manage soils

8	How to design autonomous, sustainable and resilient (in the face of climate change) cropping systems that protect soil quality?
9	Which cropping systems (design and evaluation) manage weeds and minimise tillage (e.g. conservation tillage)?
10	Which indicators to use to assess and manage adequate soil functioning (biological and physical)?
12	What knowledge and mechanisms to use to maintain the integrity of OF systems (to avoid creating "conventionalised" OF)?
13	Which tools/methods to use to evaluate ecosystem services provided by soils in OF systems, and to manage tradeoffs among them?
16	How to build an observatory or field network of soil quality in OF systems?
18	How to characterize the influence of the diversity, specific characteristics and trajectories of OF systems on soil quality?

Technico-economic and Organizational barriers

2	How to connect (capture, accrue evaluate, disseminate) different forms of knowledge (local, academic), experience and research to each other?
11	How to organize farming activities at the territory level (e.g. crop-livestock interactions, production chains): stakeholders coordination between, public policies?
14	Which agricultural equipment to improve soil quality in OF systems?
15	Which innovations (e.g. didactic, organisational, actor-related) to use to build a collective dynamics and improve consumers' perception of the importance of soils in OF systems?

Integrative' or systemic questions

5	What conditions (agronomic, economic, organisational) favour the closure of biogeochemical cycles (especially of P) at farm and territory levels? Which mechanisms (e.g. organic amendments, biological activators) to use to improve nutrient management? Where are the impacts of using them?
6	How do soils, soil organisms, soil communities and plants interact, in particular in associated crops? How to improve soil health, crops nutrition and variety selection?

¹ Question numbered according to the order of validation by the experts

Results & Highlights:

The third round produced 105 ideas aggregated in 20 questions, confirming the need of research on soils for OF systems.

- Generic questions concerned mainly knowledge's on soil functioning (3, 10), biogeochemical cycling (4, 15) and biological interactions (6, 20).
- Specific questions referred to C,N,P fluxes (4, 5), soil ecology (6) & health (1), long term dynamics and soil resilience (8, 16), impact of specific technics (5, 9, 14), tools and indicators for management (10, 13) and system design (8, 9, 12).
- Emphasize on the role of academic teaching and knowledge's transfer to end-users (2, 15) confirm need for interactions with social sciences²
- Key role played by crop livestock production systems for soil quality and resilience (11, 17).
- Needs for interactions between Agronomy and social sciences, in multi disciplinary approaches (5).



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