Participative design of conservation agriculture cropping systems in organic agriculture

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Background

Organic farmers are facing technical constraints to combine organic farming and conservation agriculture.
Factor-based experimental studies are insufficient to conclude on the feasibility of conservation agriculture on organic farms (Peigné et al., 2015).

Objectives and approach

The objective is to analyze two co-design processes.

In both cases, the overall objective of the prototyping was to preserve and promote soil fertility :

- All prototypes were designed with the same objectives and same ranking, combining expectations of the researchers and farmers (Lefèvre et al., 2013)
- For each pedoclimatic zone, the sub-groups of researchers ranked differently the objectives before designing each prototype (TILMAN-org project)

As the prototypes were designed to follow conservation principles, we compared the characteristics of the prototypes with regard to (i) soil cover, and (ii) soil disturbance.

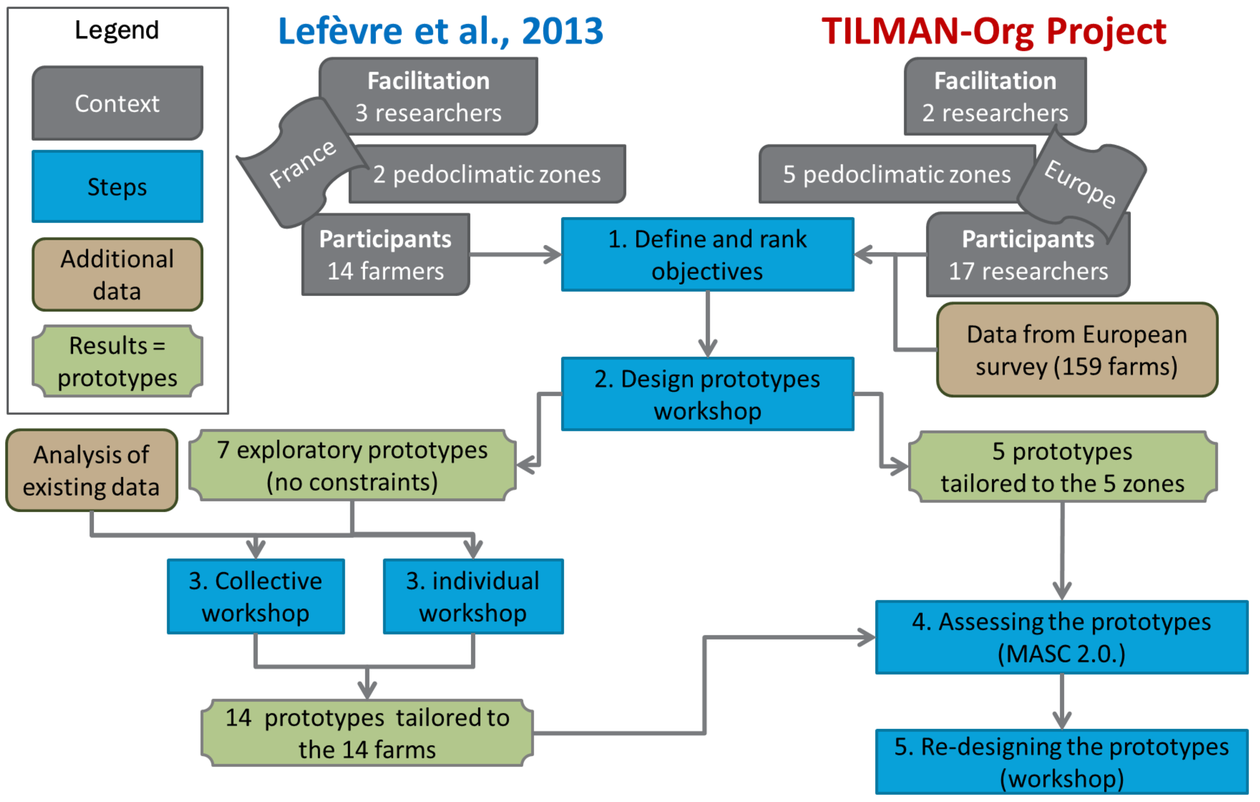
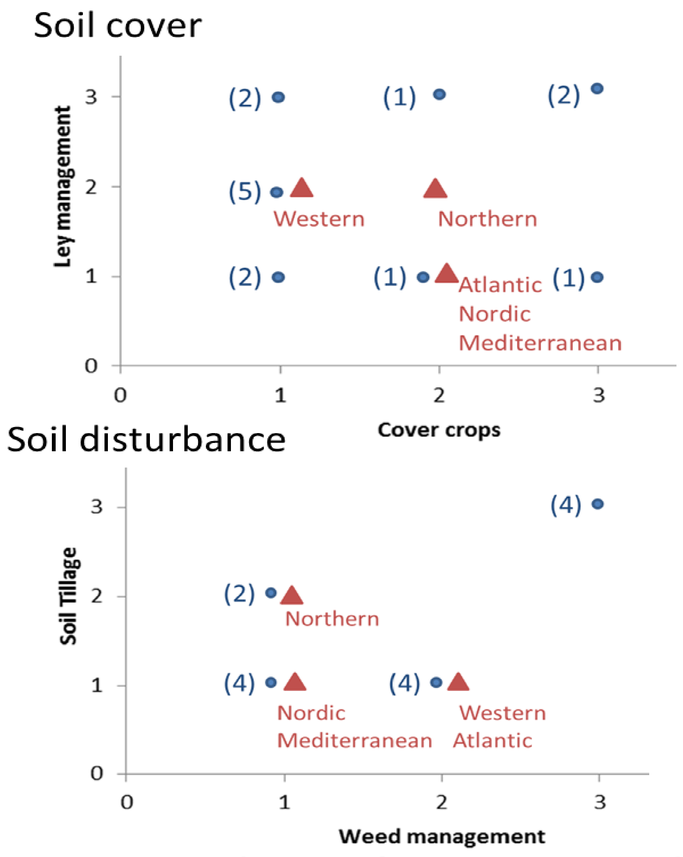


Fig. 1. Comparison of the approaches of the two co-design methods

Results and discussion



Soil cover depends on:
- *ley management*
  1: all cuts are exported
  2: some cuts are exported other are returned to the field
  3: all cuts are returned
- *cover crops*
  1: occasional or frequent
  2: systematic
  3: permanent

Soil disturbance depends on:
- *soil tillage*
  1: reduced tillage and occasional ploughing
  2: systematic reduced tillage and no ploughing
  3: 0, 1 or 2 reduced tillage operations
- *mechanical weed management*
  1: systematic
  2: frequent or occasional
  3: no weeding

Fig. 2. Distribution of prototypes according to their compliance with (a) soil cover and (b) soil disturbance (e.g. (2) standing for the number of prototypes and Nordic for the pedoclimatic zone)

Tab. 1. Comparison of the results of the two methods

Lefèvre et al. (2013) ●	TILMAN-Org Project ▲
Prototypes (Fig. 2.)	
More diversified and extreme prototypes	Based on soil cover and intensive tillage
Creativity	
More innovative because of longer period of interaction?	Restrained by their current knowledge and experiments? Trade-offs between pedoclimatic conditions and disciplines
Risk Management	
Anticipation of variable conditions	Avoiding risk in order to achieve economic objective (ranked as 1st)

Conclusions

Involving researchers and/or experts is relevant for capitalizing and operationalizing existing knowledge but the designed prototypes might lack of creativity.
With appropriate method, farmers could design cropping systems very different from their own systems.

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References

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