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## A participatory modelling approach to foster the co-construction of the collective work organization in the mixed crop-livestock farm “Domaine du Possible” in Arles, France

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**Abstract:** Dealing with the management of diversified and integrated systems in the context of group farming, this applied research investigates to what extent involving individuals can achieve better group dynamics when individuals are separately managing agricultural production activities in a participatory modelling activity highlighting organisational processes.

**Keywords:** group farming, agroecology, agricultural activities interactions, participatory approach

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### Introduction

Joining forces through group farming seems to offer many advantages, particularly through the opportunity of sharing work, resources, land and knowledge (Agarwal, 2010), promoting better opportunities for diversification of productions (Agarwal, 2010; Morel, 2018). In addition, improving interactions management between productions within the farm and optimizing ecological processes has become a key challenge for enhancing the sustainability of farming systems (Van Der Ploeg *et al.*, 2019). However, a collective management of production implies complex daily interactions (Agarwal & Dorin, 2019) defined by Agarwal (2018) as a “*fully integrated cooperation*”. This group coordination is needed in order to assign tasks between the farm’s activities, increasing the need to clarify decision making processes and work organization (Agarwal, 2018).

This article addresses a methodological approach to better understanding the articulation between work organization in group farming and the optimization of production interactions for the design of more sustainable farming systems.

### Method

This methodology is based on two different levels: (i) follow up of the processes of articulation between work organization and optimization of production interactions in the “Domaine du Possible” farm through a participative approach and (ii) on-farm surveys in order to explore management of complex group systems, each part of the methodology enriching the other.

The mixed crop-livestock farm “Domaine du Possible” is located in Arles, France. This 120-hectares farm is composed of different productions (horses, pastures, orchards, crops, vegetables), each one being managed by a hired producer. The search for a global design to link the different productions is a central issue, and so is the implementation of work organization between producers favouring interlinks between the different agricultural activities.

In order to get a better understanding of group farming challenges, on-farm surveys were conducted with 15 diversified farms in France managed by different groups of farmers, with specific strategies regarding activity combinations. Thus, the objective is to have a better representation of how divers piloting approaches can be and decision making in group farming. Those data will feed the participatory workshops on the case study farm of Arles.

To support the participatory workshops, the scenario constructions of integration of agricultural activities by modelling the different interactions (flows of materials such as manure, mutual aid, cash flows, etc.) will be implemented. The objective will be to explore different degrees of integration and to evaluate those scenarios in order to assess system agroecological performances.

## **Results and perspectives**

### **Participatory approach in Arles**

The actual system, implemented in the case study farm, shows that the different subcomponents are poorly connected and that farmers of the Domain interact at a rather low level. The first collective workshops with producers highlighted the crucial role of governance and decision-making processes to allow the pooling of resources. Thus, the work organization among producers seems to be a key element to be clarified and explored through collective workshops.

### **On-farm surveys and diversity of groups**

Two main kinds of groups were recorded: i) family farms welcoming new producers on the land in charge of a new agricultural activity; ii) groups constituted before getting access to land, often composed of people with limited agricultural background, if any at all.

The land property constitutes a key issue for most of the groups who look for ways of gaining collective access to land ownership and of developing horizontal decision-making.

Some groups are associated within a single company while others are composed of several companies which are managed by a subgroup inside the same land property, illustrating different legal choices in terms of activity combination. Then, collective organization does not necessarily involve the entire farm, and some activities are managed independently.

The time spent on collective organization varies from one half-day per week to one half-day every two weeks on average. The time spent on sharing tasks and taking strategic decisions collectively seems to be a major issue for optimization of production interactions (exchange of material flows between productions, mutual aid management, sharing of ideas and knowledge, etc.).

An analysis framework has been carried out gathering different criteria discussed during interviews : legal status, land property, diversity of the links structuring the groups, motivations to manage the farm collectively, elements structuring mutualization at the farm level, decision making and sharing of tasks.

### **Integration of data from on-farm surveys in the participatory approach**

The analysis framework has been filled by the producers of the Arles farm in order to characterize the current situation together and to explore desirable future forms of collective farm management.

The next objective of this study will be based on building scenarios of agricultural activities integration during collective workshops.

The objective will also be to remobilize the analysis framework built from on-farm surveys, questioning, for each scenario, the organizational work changes involved by the implementations of a new set of interactions such as material flows.

## Conclusion

The “Domaine du Possible” case study and the complementary surveys question the renewal of farming structures and considerations about farm boundaries in case of coexistence of several legally independent agricultural activities on the same land. The expected results revolve around the method used to set up, in collaboration with onsite actors, an organizational model that favours the interactions between activities while running an ongoing case study, with the aim of extracting a reproducible method.

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