Promoting organic research and development: lessons from an interdisciplinary group from France (2000-2013)

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Promoting organic research & development: lessons from an interdisciplinary group from France (2000-2013)

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Abstract

At INRA, the CIAB (INRA Internal Committee of Organic Agriculture) is the main driver of an organic research program. This paper addresses whether funded projects comply with the main objectives set out in the program. A database was built with all of the 40 project proposals that were finally approved. It enabled to depict participation in collaborative networks. The analysis highlights three major benefits: (i) Structuring scientific and professional partnerships, (ii) Mobilizing new research teams in the organic program, (iii) Supporting interdisciplinary approaches.

Introduction

Organic agriculture (OA) presents itself as a knowledge-based agriculture. It raises specific or new research questions. It is also connected to other forms of agriculture, while expanding the range of study situations explored. At INRA (French National Institute for Agricultural Research), the CIAB (Internal Committee of Organic Agriculture) is the main driver of an organic research program. This committee is responsible for promoting and enhancing research in OA, namely through the launch of national calls. Seven calls were launched in the last 13 years, supporting 40 projects. The aim of this paper, written by research workers who contribute to CIAB, is to analyse whether these projects comply with the main objectives set out in the program. Two of the objectives were: (i) meeting R&D challenges in OA and (ii) fostering a dynamic network with partners and between INRA units (Sylvander and Bellon, 2003). This also enables us to assess the conditions of the production of scientific knowledge on and for OA, as well as the degrees of interdisciplinarity and partnership in these projects. Finally, we draw lessons on the relevance of associating skills for the identification, management and evaluation of research projects.

Material and methods

To analyse the projects supported and coordinated by this organic research program, we created a data base with all of the 40 project proposals that were finally approved. We categorized project participants according to their affiliation (institution type> institution> laboratory) and discipline (based on the disciplines declared and a categorization according to the disciplinary areas of the Web of Science). The analysis then focused on a set of indicators: duration, weight (number of entries) and diversity (Shannon diversity index and evenness, quoted E). These indicators reflect

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connections among the institutions and disciplines mobilized. We interpreted their value with the topics of the calls, the source of funding (INRA or joint calls), and the overall context of research in OA. The data base that we built also made it possible to depict participation in collaborative networks at different levels (individuals, laboratories, disciplines). The data were analysed using *Gephi* software[4], enabling us to identify the key actors according to their structural characteristics in the collaborative network, using the indicator of betweenness centrality (Degenne and Forsé, 2004). This approach in terms of collaborative network can handle the cross-partnership in the research program.

Results

Structuring a network of scientific and professional partnerships

INRA remains the main institution involved (60% of the participants over the period concerned). It is the only one over the entire period that answered all of the calls. Our analysis also identifies more than 55 partner organizations, including 28% from the development sector (technical institutes, associations), 10% from the educational sector (universities, agricultural schools) and a few private companies (1%).The range of the partnership is on average 5.2 institutions and 6.3 laboratories per project. Partner institutions invest rather homogeneously (Equitability = 0.8). This investment significantly increases in the two joint calls (2/7 calls), where the technical or professional expertise of projects was also requested. Three of the projects funded in this joint call included 14 to 18 partners, with a strong problem-oriented approach (reduction in the use of copper, fertilization, participatory plant breeding). Joint calls also entailed a longer process. Almost two years elapsed before starting the project, with: the combination of professional expectations and scientific knowledge synthesis, a double evaluation of pre-projects, seminars for co-building projects. Conversely, some of the topics addressed in three projects supported only by INRA were mostly led by researchers (e.g. on organics as commons). The call topics also determine partnerships and disciplinary contributions.

Mobilizing new research teams in the organic program

The program also aimed at encouraging new teams and new partnerships to develop research projects in OA. This incentive function also facilitated the construction of collectives that can later leverage other funding. The analysis of participants in the 40 projects funded shows a large "turnover": 61% of the organizations only answered the calls once. This turnover was also observed in the INRA units. A total of 70 units and 258 INRA employees contributed to projects, whereas 69% of the units responded to one single call. Conversely, 5.5% of the INRA units were present in 4 out of the 7 calls. Smaller organizations dedicated to research and experiments in OA also contributed regularly (presence in 5/7 calls with 26 entries for GRAB and 18 entries for ITAB[5], from 2000 to 2010), which shows their ability to engage in partnerships.

Resulting networks and partnerships

The program resulted in an effective networking of research and professions, likely to enhance or initiate structuring. A matrix combining research units and projects was designed, based on the contribution of each unit (duration, n° of calls, centrality) and

[4] Available at https://gephi.org/

[5] GRAB : Research Group on Organic Agric.; ITAB : French Technical Institute of Organic Farming

partnerships among units (hierarchical clustering). This highlights some inertia around thematically related projects (e.g. meat sheep livestock systems). In contrast, some projects or laboratories seem more dispersed, resulting in high degrees of cross and thematic partnerships. ITAB exhibits the highest degree of partnership. In addition, analysis of the centrality of these institutions according to their participation in various projects makes it possible to visualize the partnership network (Fig. 1).

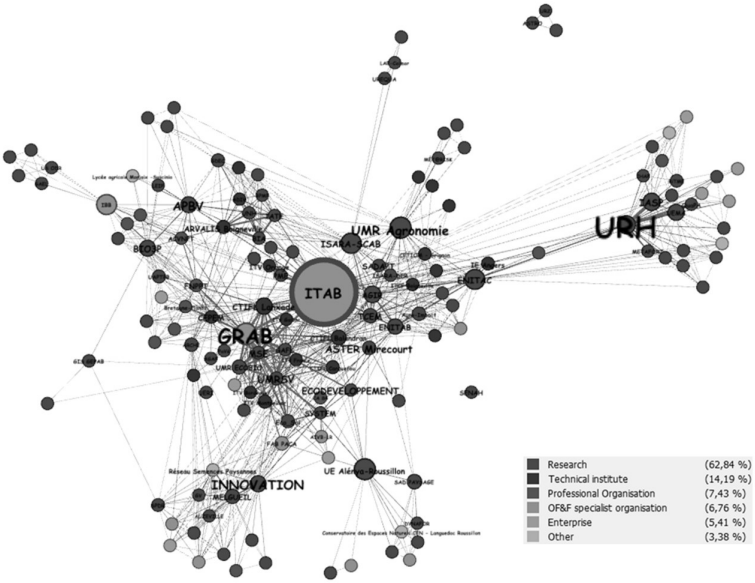

Figure 1: Partnership network of collaborations and ranking of research units according to their structural characteristics: indicator of betweenness centrality (Node size: betweenness; Color: type of institution; Label: number of entries; Links size: number of co-participants in projects)

This figure confirms the inertia observed for projects in sheep production and the pivotal role of the some research units (e.g. URH in the right-hand corner). ITAB is influential through its participation in many projects. Other structural entities, are represented by GRAB and some INRA units (Innovation, Agronomy, etc). However, partnerships are also built pragmatically and geographical proximity is an important factor. Several regional poles can be identified (Brittany, Ile de France, Southeast, and Auvergne). Their experience in terms of institutional practices for collaborative research led to the development of unifying projects in response to the needs of professionals (e.g., potato breeding, sheep production).

Combining disciplinary and interdisciplinary approaches

Although agronomy largely dominates (45% in all calls), especially in joint calls, a total of 27 disciplines were mobilized in the 40 projects. The simultaneous presence of these disciplines gives INRA a specific asset for an integrated expertise and a diversity of approaches on many of the issues that may arise in OA. On the average, four disciplines are associated per project. In the first calls, research was mainly

focused on analytical approaches and almost exclusively on plants. There was, in fact, an urgent need for mastering production techniques (fertilizer, seeds and seedlings, plant health, etc) with relatively limited resources. These questions were not addressed by conventional technical institutes, and professionals in OA solicited support from public research. Only a few projects had a systemic approach and clear interdisciplinary ambitions (organic bread, transition trajectories). This combination is consistent both with the interdisciplinary composition of CIAB and with the premises of the research program: systemic work can help to identify hypotheses to be tested analytically; analytical work is also useful for understanding processes in order to better manage them (e.g., with life cycles of diseases or pests).

Discussion and conclusion

The calls and subsequent projects cover a wide range of topics, as expected in the INRA research program. Topics addressed can be grouped into three categories: (i) understanding and supporting OA as a production system; (ii) shifting from a means-based approach to a better mastery of OA performances, (iii) supporting the development of OA as a prototype of innovative agriculture (Bellon and Penvern, in press). Although many projects were oriented towards solving practical problems, some projects can be considered as more prospective.

The low presence of the private sector in projects is also due to the focus on issues related to the control of production processes, with a few exceptions. Moreover, the "turn-over" observed in partners and teams also questions the duration of the partnership and the ability to support ambitious projects of longer duration. Our analysis was restricted to one specific program, whereas some continued with other calls (from regional to EU). It could be expanded in two directions: (i) including research results (knowledge and impacts) of this program, and (ii) extending the analysis to other projects, using the data base presented in this paper.

The analysis of institutional partnerships revealed the benefits of unifying joint calls, with a number of partners mobilized around a common project. However, a large number of partners does not guarantee the scientific quality of the project and may result in high transaction costs in terms of coordination.

A research project in OA and for OA is a complex learning process, as much about the phenomena as the actors (roles and responsibilities) and mechanisms at work. Research teams operate in partnership with and among the professionals involved. This approach involves alliances to mobilize financial and cognitive resources and to build social capital. It also acts as a gateway to the sciences that goes beyond certain boundaries between different models of agricultures.

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