

Institutionalizing Agroecology in France: Social Circulation Changes the Meaning of an Idea

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Abstract: Agroecology has come a long way. In the past ten years, it has reappeared in France throughout the agricultural sector and is now included in public and private strategies and in supportive policies, with collateral interest effects. Is a new “agro-revolution” taking place? To address this issue, using a methodology mixing hyperlink mapping and textual corpora analysis, we focus here on the trajectory of agroecology in various worlds: that of academia, social movements, non-governmental organizations (NGOs) that promote international solidarity, research and training institutions and public policies. This trajectory intertwines actors and time lines, with periods in which certain actors play a specific role, and others in which interactions between actors are dominant in terms of coalition advocacy. Some actors play a major role in circulating agroecology as they belong to several different social worlds (e.g., academia and NGO), present high occupational mobility (from politician to scientist and vice versa), are charismatic or have an irradiating aura in the media, and can articulate and circulate ideas between different social arenas (including between countries). The stabilization of networks of actors is interpreted as the institutionalization of agroecology, both within social movements as well as because of its integration into a policy aimed at an ecological modernization of agriculture. The international positioning of many actors anchors national and regional initiatives more strongly. It is also a prerequisite for the amplification and development of agroecology.

Keywords: agroecology; France; genealogy; institutionalization; social movement; science; policy

1. Introduction

France plays a special role in the dynamic landscape of agroecology in Europe. In spite of pioneer works that explicitly used the term agroecology in French literature in the past [1,2], more than 25 years elapsed before the term significantly appeared in a variety of arenas: social movements, NGOs promoting international solidarity, public policies, research institutions, agricultural schools, the private sector, etc. Indeed, differences are evident among these actors in their dynamics of use and understanding of what agroecology is about and what its purpose is. Based on an international comparison, Wezel et al. [3] already suggested considering agroecology as the interaction between “sciences, practices and movements”. Conversely, the policy dimension of agroecology was relatively absent in the past, except in the case of Brazil [4], whereas it only appeared in France in 2012 with the arrival of Stéphane Le Foll in the French government.

In this paper, we focus on the French situation and update our previous work [5], with the intent of addressing how the institutionalization of agroecology can enable a transition in agricultural and food systems. Our previous analysis of the institutionalization of the concept of agroecology [5] showed that before agroecology appeared on the French policy agenda, the French Web space of actors referring to agroecology was structurally and semantically polarized. A first polarity consisted of high-level organizations, whether they be international (e.g., the Food and Agriculture Organization [FAO]) or national with an international mandate (e.g., the French Development Agency

[AFD], the French Agricultural Research and International Cooperation Organization [CIRAD] or the International Association for Ecologically Intensive Agriculture [EIA]). The opposite polarity was primarily represented by NGOs, namely those that developed criticisms about the industrialization of agriculture and promoted humanistic or organic visions (e.g., those that revolved around P. Rabhi and the association “Nature et Progrès”, created in 1964).

In this paper, we analyze how the agroecology idea circulates through different social arenas (scientific, educational, policy, civic and economic) and the way that this circulation affects the meanings of this idea and, consequently, its institutionalization in France. The circulation of ideas and knowledge is conceptualized in many social science traditions, such as social study of science [6], history of knowledge [7] or history of political thought [8]; it is also an alternative to the model of an unidirectional diffusion of immutable and hegemonic knowledge [9,10]. Indeed, circulation is at the same time (i) a revealing methodological gaze, taking seriously spatial, temporal, and social anchorages of ideas as well as material and interactional incarnation of ideas and knowledge, and (ii) a social process affecting the shaping of significations of ideas or knowledge as well as the evolution of associated advocating epistemic communities.

According to various social science theories such as the structuration theory [11], discursive neo-institutionalism [12,13] or the actor-network theory [14], we consider institutionalization as a gradual process of creating and stabilizing relationships between actors, as well as sharing common ideas and norms that make collective action possible. Our gradual approach differs from more binary ones considering institutionalization as being (i) limited to formal and powerful organizations and (ii) detrimental to a genuine transformative program in agroecology. The first argument assumes a strong dichotomy between institutions and social movements; this is especially advocated by criticisms originating in Central and South America [15]. However, we argue that a social movement is not so distinct from an institution. Literature defines a social movement as “*collective enterprises seeking to establish a new order of life*” [16], attempting to promote a specific framework on a social problem to be incorporated into the mainstream institution [17]. As stated in the stage model of social movements [18], a social movement often progressively acquires institutional properties: coalescence and stabilization of relations between actors sharing close ideas, forms of bureaucracy needed to organize collective action and eventually creation of formal organizations with professional employees and working rules and conventions. Moreover, a social movement is always connected to mainstream institutions, as an opponent, as an interlocutor or even as a resource provider. Regarding the second argument about the transformative potential of agroecology, some authors showed diverging trends in the agroecology political trajectory at the European level: one that was incorporated into the dominant agro-food regime, and the other that aimed to contest it [19]. This appropriation of agroecology (also known as “co-optation” [15,20]) also leads to resignifications [21,22] such as “peasant agroecology” [15], “political agroecology” [23] or “deep agroecology” [24].

Based on these premises, we show that: (i) updating the image drawn in 2011 (opposing mainstream and social movement organizations) shows that new actors play a role in the national agroecology scene whose institutionalization also concerns social movements; (ii) promoting an inclusive vision of agroecology on a political agenda enables both the interest or enlistment of a wider range of actors (including the private sector and advisory councils, beyond the “science/practice/movement” triad [3]) and the demarcation of other groups willing to shift from the continuous productivity/competitiveness framework/paradigm; and (iii) focusing on France confirms the internationalization of agroecology, with networks and associations across the social, south-north and disciplinary boundaries.

In this paper, we focus on the French actors to analyze the dynamics of institutionalization of agroecology through the emergence of interlinking organizations. The first section presents the data collection and analysis methods used, whereas the second section presents the results: first, describing how the term agroecology spread in France—especially during the past decade—with a general mapping; second, through the focus on research programs in agroecology, with specific organizational links

in collaboration networks; and third, with a cross-cutting analysis of public policies that promote agroecology. We conclude by reflecting upon what these institutional dynamics can tell us about the changes of meaning via the circulation of ideas from social movements to academia and policy, and about the future development of agroecology in Europe.

2. Material and Methods

To study the emerging semantics around agroecology, we considered the investment of different actors in the construction and the existence of such a formula, as conceptualized by Krieg-Planque [25], even though other forms pre-existed (alternative, organic, sustainable, etc.) [26]. Agroecology is also an oxymoron, i.e., the association of apparently contradictory words, agronomy, and ecology, which induces polysemy. This polysemy also comes from the work of demarcation-or convergence—that its different users apply. Agroecology is not a given but a multiple construction. Hence, we do not make normative judgments here about what it should or should not be. We describe the use of this term as a formula [25], or “flagship words” and other slogans, which function as a social reference. This reference can become an issue of controversy between actors with diverging socio-political visions, professional identities, or academic domains. We thus focused on the way in which the term agroecology is mobilized by different actors in social movements, in the professional agricultural environment and in research bodies (programming and projects).

At the methodological level, focusing on recognized, established material or digital traces, we tracked down the different modes of existence and social construction of the formula and its variations (nouns, with or without a hyphen and adjectives), in the French social space by mobilizing several resources.

First, to map the online public sphere involved in agroecology, we used web crawlers [27,28]. Crawlers are software that allow the automatic extraction of hyperlinks between websites. We selected iteratively the relevant websites to be crawled to their use of the terms related with agroecology. The data collected can then be analyzed using social network analysis methods. Indeed, empirical studies of the Web showed a correlation between the structural position in the network of hyperlinked websites and positions with respect to the issue they treat [29,30]. Moreover, many webometric studies showed that creation of hyperlinks is a strategic choice of actors managing websites which has sociological significance (indicator of authority, ideological affiliation, institutional recognition of allied actors, political homophily, community and identity building) explaining the use of such hyperlink mapping in the analysis of social movements or political agenda-setting analysis [31]. Hyperlink mapping makes it possible to detect the most influential agroecology actors, the main cluster of actors (using Blondel community detection algorithm [32]) and finally to compare the evolution of the overall social morphology of the actor network interested in agroecology between our 2011 and 2018 mappings.

Second, to give a general overview of the agroecology dynamics in many arenas in quantitative terms, and on the basis of the hyperlink mapping, we built (i) corpora from academic sources (INRA, CIRAD, IRD open archives as well as French articles indexed by Web of Science) and (ii) a corpus of French national and regional mass media extracted from Factiva and Europress databases ($n = 10,694$ newspaper articles). Texts in both corpora contain words derived from agroecology. Through a simple counting of documents over time, computed with our own R script, we showed the evolving importance of discourse about agroecology in both corpora (Figures 1 and 2A). Figure 2B displays the number of occurrences of important actors of agriculture or agroecology in the French mass media corpus. To analyze the content of this corpus, we used the lexicometry software Iramuteq [33] which provides the main lexical clusters and thus the framing of agroecology in mass media.

In interaction with results from the hyperlink mapping and the previous quantitative overview, we finally built a textual corpus requesting search engines on main actors' websites to identify relevant publications about their investment on agroecology (e.g., biographies, annual reports, programmatic documents...). Thanks to our institutional position inside INRA, i.e., the first national

public agricultural research institute and invested in agroecology, we have also conducted participant observations and thus accessed to internal documentation completing the previous corpora. From the perspective of a qualitative socio-historical analysis, documents of those corpora (academic publication, newspaper articles, webpages and internal documentation and observations) were closely and qualitatively read, and when relevant are directly cited in the following sections.

This methodology makes it possible to highlight the relationships between the actors, at least as they appear through hypertext links, and the discursive content they develop around the term of agroecology. Thus, the meaning of the term stems from both its discursive content and its social embedding.

3. Results: How the Term Agroecology Circulated in France

3.1. An Overview of Agroecology Discourse

The dynamics of agroecology use in three significant agricultural French research institutes (CIRAD, IRD in Southern countries and INRA in France) and in French academic articles indexed in Web of Science is presented in Figure 1. All sub-figures show a small number of publications containing the word, followed by an increasing use pattern since around 2005 but with some temporal and volumetric differentiations between institutions. Indeed, agroecology is first found in the IRD (previously ORSTOM) archive in 1957 within the title of a report [34] of Robert Dufournet, an agronomist based in Madagascar. This first attested use of agroecology, mainly as synonyms of “pedo-climatic”, is followed by sporadic mentions. After 1985, about 10 publications per year contain the word agroecology, except in 2015 with several chapters from a collective book on soil productivity restoration [35]. Indeed, CIRAD is the institution with the most significant and early investment in agroecology with an exponential number of publications since 1995, after some sporadic mentions following a report from René Billaz in 1981, on research for the development of rural areas [36].

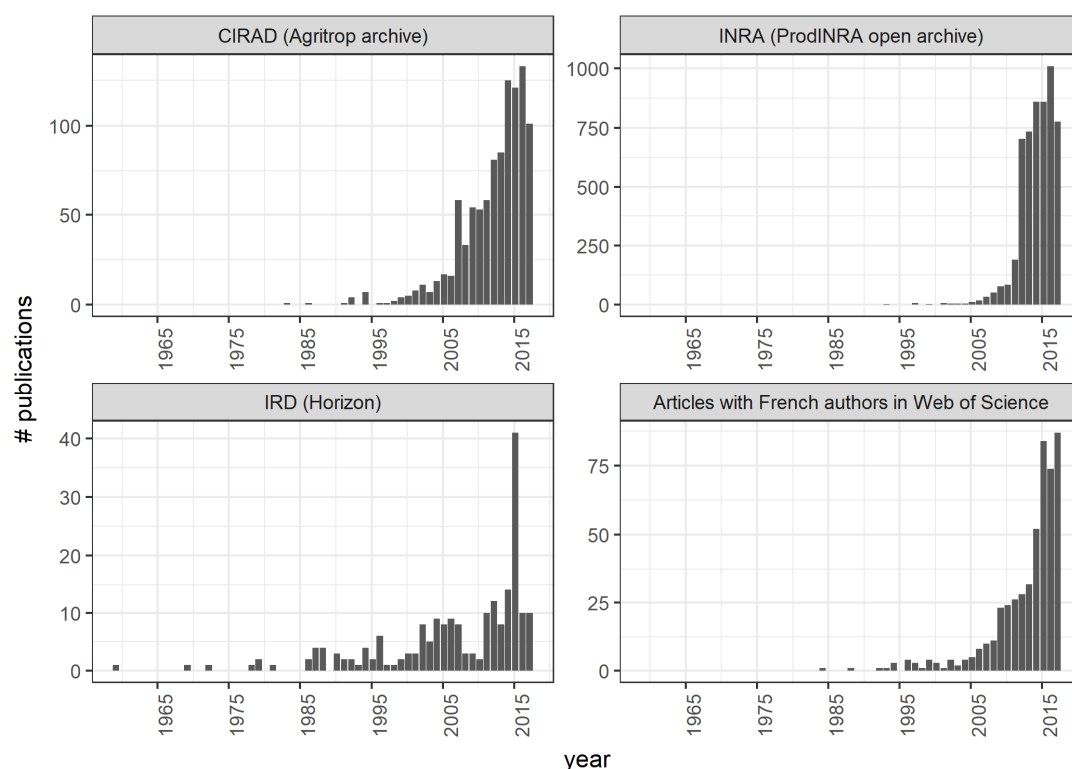


Figure 1. Dynamics of French academic production on agroecology from institutional open archives and Web of Science (author: G. Ollivier).

The first mention of agroecology in INRA publications is attested in a communication [37] of Jacques Baudry, one of the first ecologists at INRA, during the 1986 INTECOL Congress (in Syracuse), where the INTECOL president, Frank Golley, asked Stephen Gliessman to organize a symposium on agroecology inside this international association [38]. After a long period of sporadic use, the number of INRA publications containing agroecology increased strongly since 2011, after a slight growth since 2005. The volume of INRA publications is around ten times greater than the CIRAD one.

The corpus of French national and regional mass media is presented in Figure 2. Figure 2A shows the increasing presence of agroecology since 2002 and especially a few months after the arrival of S. Le Foll as Minister of Agriculture, who radically changed the amount of discourse produced in mass media. The figure also shows that agroecology was used, albeit at a very low level, since 1976 in a newspaper article mentioning a FAO work on world agroecological mapping. Figure 2B shows the continuous and substantial influence of Pierre Rabhi in the mass media since 1995. Others key actors remains relatively less mentioned. CIRAD and then INRA appeared associated to agroecology in 2000. Nicolas Hulot, as president of his eponym foundation, appeared in 2005 at the time of the publication of book co-authored by Pierre Rabhi [39]. Their relationship was frequently mentioned in newspapers while N. Hulot as new Minister of Ecological Transition since 2017 still promotes agroecology. Finally, main farmers' unions (FNSEA, the dominant one, and Confédération Paysanne, the left-wing minority one) are not relatively prominent in the debates. The Confédération Paysanne is associated earlier with agroecology in the mass media, in 2001, and with a higher share than FNSEA, who only appeared in 2009 and then mostly during the legislative debate on the S. Le Foll's policy. In the newspapers, S. Le Foll is associated with agroecology only a few months after its entry in Ministry of Agriculture.

Figure 3 represents comprehensively the content of the mass media corpus. It highlights some main actors and the respective framings, institutional environments, and types of action they convey through they presence in newspaper articles. Thus, on the one hand Pierre Rabhi, as peasant agroecologist and philosopher, appears to be associated to a strong communicative activity, through book or films, and to its movement "Terre et Humanisme" (cluster 6). Cluster 4 represents the importance of his field work thanks to a multitude of events all around France (often mentioned in Regional newspapers). Still close to the Rabhi's universe, one can also note that agroecology is, in the press media, strongly associated to permaculture and gardening social activities. On the other hand, another set of lexical clusters (1, 5 and 2) are associated to very different actors and themes. Cluster 1 shows that many newspaper articles are dedicated to the Minister Le Foll and agricultural policy issues (particularly environment and competitiveness) with a strong focus on the legislative issue about the law called "Loi d'Avenir pour l'Agriculture" (LAAF, 2013) which recognizes and defines an agroecological approach. Interestingly, the main opposed farmer's unions (FNSEA and Confédération Paysanne), as well as the CAP (Common Agricultural Policy), appear in this context of representation and negotiations. In another institutional register, clusters 5 and 2 reveal two different framing close to governmental agroecology. Cluster 5 is dedicated to global issues in agriculture (climate change, food, and poverty) and is associated with FAO dynamics. Cluster 2 concerns the local objects and scales of agroecology implementation, from plot to farm going through Chamber of agriculture and farmers.

These general data, dynamics, and milestones give a picture of the French universe of agroecology and the diversity of his actors, whereas the next section goes deeper in the socio-historical analysis of agroecology in France.

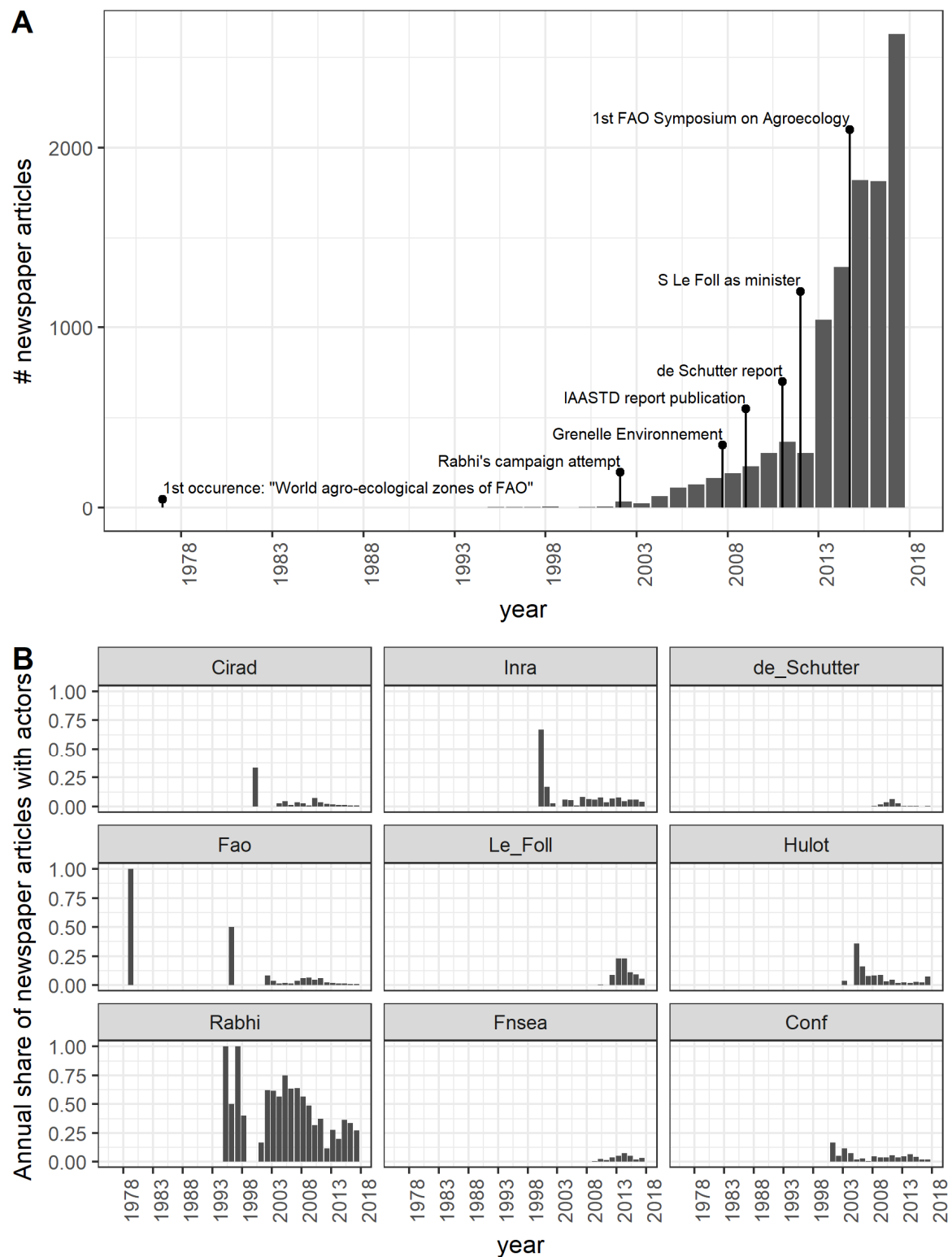


Figure 2. Dynamics of public attention to agroecology in the French mass media corpus: (A) Evolution of the number of newspaper articles mentioning agroecology with a projection of some meaningful events and (B) Evolution of the annual share of newspaper articles mentioning key actors (author: G. Ollivier).

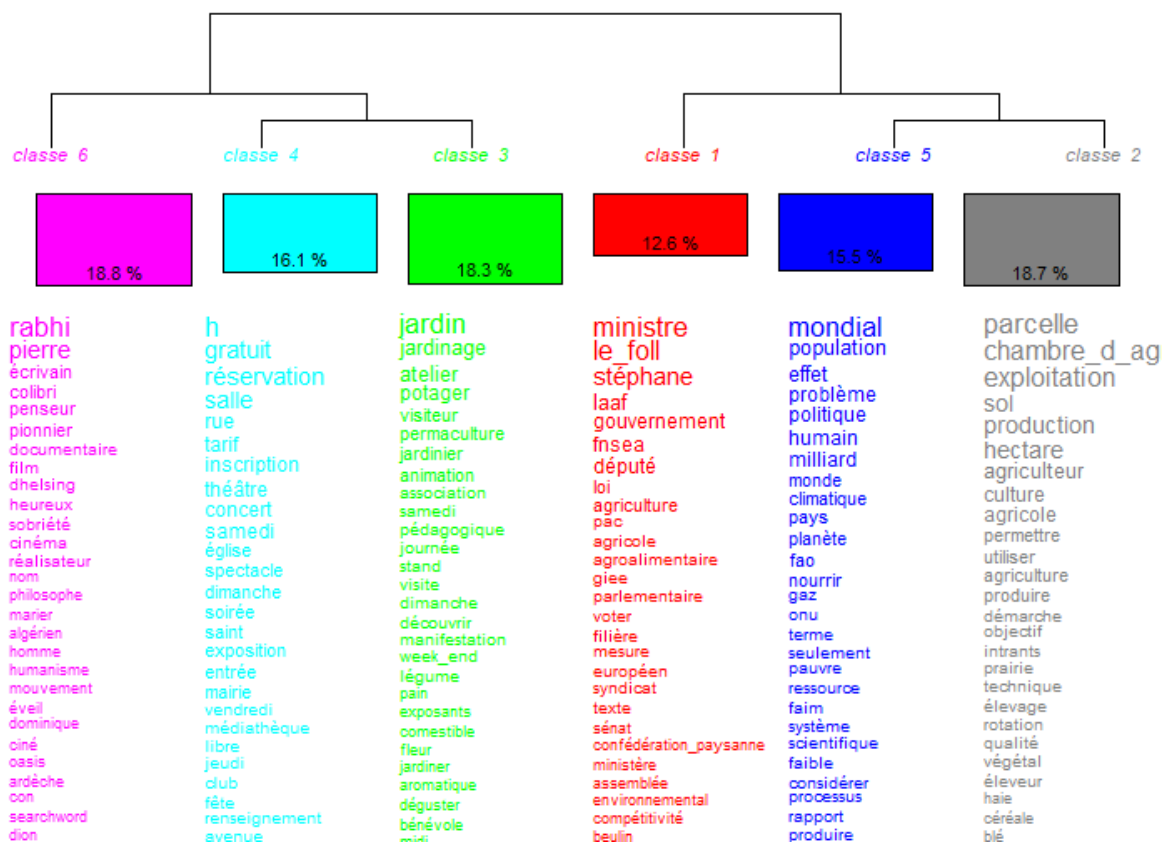


Figure 3. Main lexical clusters in the French agroecology mass media corpus analyzed using Iramuteq Software (author: G Ollivier).

3.2. An Archaeology of French Scientific Agroecology: Pioneers Preaching in the Desert

3.2.1. Some Isolated Academic Pioneers Connected with Developing Countries

In the past century, agroecological roots can be found in agrarian ecology, especially between the two World Wars. This tradition was more prevalent in Italy (G. Azzi) or Germany (W. Tischler), whereas agronomy prevailed in France. Although the leading authors were not French, some of their publications were translated or referred to in France [40–42]. However, in 1967, the French agronomist S. Hénin defined agronomy as being “an applied ecology to plant production and agricultural land management” [43]. He also prefaced a series of books by J. Duthil entitled “Elements of Agronomy and Ecology” [44] oriented towards more in-depth knowledge or problem-solving in agriculture. In France, the separate development pattern of agronomy and ecology, on the other hand, is perhaps indicative of the notion of agroecology as a scientific field [45,46]. However, other routes can also be found in tropical agriculture.

The stream of colonial agronomy appeared at the MNHN (National Museum of Natural History) and progressively evolved towards tropical agronomy (1958) and the French ethnosciences (1963), with the impetus of people such as A. Chevalier, R. Portères and A-G. Haudricourt [47]. These agronomists were considered to be unorthodox, partly because they worked at the MNHN [48] and mostly because they were interested in both agronomic practices and cultural practices, and the human-nature relation. They were influenced by botany, linguistics, genetics, and ethnology. Throughout its history, this stream periodically refers to agroecology, as shown in the archives of successive journals since the 1930s [49–51] where they repeatedly refer to the seminal work of Bensin on the agroecology of corn. In 1947, R. Portères published a “tropical agro-ecology course” [52]. Haudricourt introduced into France, the ideas of the famous Nicolai Vavilov, the Soviet agronomist,

botanist and geneticist who explored worldwide the origins of domesticated plants. For instance, Haudricourt reviewed his posthumous publication whose French translation is entitled “*Essai d’une revue agro-écologique des principales plantes cultivées*” [53]. Along these lines, some of the authors themselves used the term ‘agroecology’ (e.g., [54,55]). Yet, their emerging disciplinary identity is not based upon the word agroecology. Rather, in the 1960s, their emphasis was on the institutionalization of ethnosciences rather than that of agroecology as a discipline, as indicated by the denomination of their laboratories, journals and courses [56].

On the side of agronomy, some rare figures converted to ecology while most agronomists remained focused on the maximization of production. During the 1970s, René Dumont, a productivist agronomist who had converted to ecology, became the first ecologist candidate for the French presidential elections of 1974 [57]. Dumont also prefaced the French edition of a reference book coordinated by M. Altieri [1] in which he acknowledged our ignorance of farmers’ knowledge and underlined a lack of social and economic dimensions in this book. He headed the Chair of Comparative Agriculture and Agricultural Development at INA-PG (National Agronomic Institute), an important institution for training agronomists, including M. Dufumier, a vibrant defender of agroecology who succeeded Dumont.

Several agronomists who foresaw the bottlenecks in the Green Revolution model in the South also underwent a similar conversion. Some of them used the lexicon of agroecology, especially those who carried out work in West Africa in the Sahel [2,58]. In his memoir [59], René Billaz, the first scientific director of CIRAD, reported that in Burkina Faso, these researchers converted to agroecology by observing that the major droughts of the 1970s revealed the limits of the Green Revolution and by acknowledging the resistance of farmers and their creativity in adopting alternative practices. This area was the subject of an “Agroecology Project” supported by a German NGO, the Deutsche Welthungerhilfe [60]. Interestingly, this is reminiscent of similar patterns used by other pioneers in agroecology working in extreme environmental conditions [61–63], leading researchers to focus on the adaptation of production to their environments rather than transforming the environment in favor of production.

In addition, in the 1980s the new divisions INRA-SAD and CIRAD-SA of national research institutions developed the agrarian system approach [64]. Both advocated a systemic approach, interdisciplinarity and action-oriented research, especially in areas where the “modernization” of agriculture was not implemented or successful. As for INRA-SAD, this also contributed to being part of the wider movement of “Farming Systems Research” [65], as well as being identified with the broader scene of agroecology [66,67] but not identified with the nascent American agroecology movement. As for CIRAD-SA and other development agencies, this marked a turning point in the forms of cooperation with foreign countries, shifting from commodity or production-oriented to farming systems research [68]. Some trajectories of individuals can also be mentioned due to their role of intermediary between the north and south and between academia and society, and to their early identification as agroecologists (e.g., R. Billaz, F. de Ravignan, S. Pérez-Vitoria).

To conclude, the archeology of French scientific agroecology is based upon individual researchers with unconventional conceptions of agronomy and agricultural development. However, these individuals, even those working in collective organizations within research institutions (e.g., INRA-SAD) remained on the margins of these institutions. Some of these researchers left their institutions (e.g., G. Toutain and C. Bourguignon), whereas others led a “double life” inside and outside of their professional institutions through their involvement in associations. In fact, several CIRAD and INRA researchers were also active in solidarity NGOs that were very involved in the agroecology social movement (e.g., La Ligne d’Horizon, Geyser, the GRET and AVSF).

3.2.2. Agroecology as a Flagship for Social Movements Involved in South-North Exchanges and Criticizing Modernization

In the 1980s, most of the investment in agroecology could be attributed to social movements. Among them, the NGO “Nature & Progrès” and the NGOs created by Pierre Rabhi played a key role. Both are related to organic agriculture in terms of their purpose or of the history of their leaders. As in other countries, some individuals strongly embodied their association(s), especially P. Rabhi (for a more complete analysis of the trajectory of this “peasant-philosopher”, see [5]). He helped to open a new path, positioning agroecology as an “ethics of life”. As Figures 2 and 3 (classes 6 and 4) show, his vision has been widely publicized through conferences, ecosites, training, publications, and political engagements, including his bid for the 2002 French presidency. Both his presence in the public arena and the many organizations he created (Terre & Humanisme, Colibris, Mouvement des Oasis en Tous Lieux, Mouvement Appel pour une Insurrection des Consciences, Fondation Pierre Rabhi, Kaizen magazine, etc.) are markers of his institutional activism, allowing him to enlist many influential people from the world of show business (singers, comedians) and politics, particularly Nicolas Hulot, the current French Minister of Ecology [39].

Born in Algeria in 1938, P. Rabhi moved to Paris where he became a specialized manual laborer. In 1960, he left the city for the countryside. As an agricultural worker, he realized that the productivist logic of the factory was also applicable to the countryside. He settled in the Cévennes region in 1962 where he discovered biodynamics through the book, “*La fécondité de la terre*” by E. Pfeiffer. This source of inspiration can be found in Rabhi’s proposals [69]. The notions of organism and metabolism are central to this economy of nature; humus is considered to be the keystone of our humanity. The attention to mother earth-nurturer is not a metaphor but an objective reality, a living universal condition of our food and our renewal. He then distanced himself from organic agriculture (also called “agrobiology” at that time), arguing that its focus was on soil fertility (at the expense of a wider vision of our environment) and on the creation of a market for OECD countries (overlooking the South). These two arguments led Rabhi to use the term agroecology in the late 1980s. “*Agroecology is much more than a simple agronomic alternative, it is linked to a profound dimension of respect for life and places the human being in his responsibility towards the living*” [70] (authors’ own translation). In this vision, man and humanistic values come first. Nevertheless, the agricultural dimension is also present, with facilities that preserve the integrity of resources, in small structures oriented towards autonomy, recycling and qualitative and localized production. The proposed program is based on an ecology of contexts, embodied in various places by prototypes and training actions. It leads to and relies more widely on associative initiatives or foundations in which everyone can contribute to the search for economic, social, and cultural alternatives. On the other hand, contrary to other trends that place agroecology as an interdisciplinary research program, especially in America, P. Rabhi leaves little space for other scientific knowledge. In fact, he asked the agronomist Dumont to evaluate his practical experience, but both men disagreed about the type of rationality given to compost, seen by Dumont as the “*propagation of the antiscientific thesis of Steiner*” [57]. This disagreement between two pioneers in agroecology is an archetype of the kind of epistemic friction that can be met behind the slogan “agroecology as a science, practice and movement”.

In the journal Nature & Progrès [71] and in two subsequent books [69,70], Rabhi depicted his investment since 1978 in agrobiological and then agroecological education. He contributed to the creation of training and demonstration centers in Gorom-Gorom (Burkina Faso) in 1984 and later on (1989) in Viols-le-Fort (CIEPAD) in the south of France, after the assassination of the Burkinabe President Sankara who was a staunch supporter [72].

Referring to this international dimension, Rabhi [70] states that “*The Gorom-Gorom experiment has brought about an important dynamic. The IFOAM scientific conference that was held in Burkina Faso in 1989 has endorsed the value of agro-ecology at the international level as a basis for sustainable development*”. In the meantime, the international organic movement was still under construction and in search of its identity and hesitant about its own denomination [73]. On his side, Rabhi identified himself in 1983 as

an agrobiologist or biodynamist [69], and later on, at least in 1989, as an agroecologist [70]. Indeed, as with the previous IFOAM conferences in the USA (Boston in 1982 and Santa Cruz in 1986), which used the term agroecology in their titles, the IFOAM conference in Burkina Faso is said to have been a moment for the structuring of international agroecology [74,75].

Through his movement, Pierre Rabhi met many people in the 1980s who worked towards the development of agroecology [76]. With the support of local politicians, Rabhi created the CIEPAD in 1989 with Patrice Burger, ex-director of Gorom-Gorom, Jean-Luc Messe, former president of Nature & Progrès, François de Ravignan [77] and Robert Morez [78], tropical agronomist and author since 1992 of the journal *"Cahiers de l'Agroécologie"*, synthesizing references from Altieri, pioneers in organic farming, Claude Bourguignon and CIRAD [79]. In 1998, to perpetuate this role of north-south hub, they created the association CARI [80], which connected them to the world of international solidarity NGOs. In addition to technical support for local development projects in the Sahel, they were involved as experts in the work around the UN Desertification Convention (UNCCD) within the NGO coalition called the *"Groupe de Travail sur la Désertification"* (GTD, also based in Viols-le-Fort), consisting of AVSF, Agrisud International, the GRET and Terre et Humanisme [76].

Nature & Progrès, the most radical NGO in the French organic movement [81], used the term "agroecology" as of the mid 1980s when referring to P. Rabhi's activities in its eponym journal [82]. In 2010, Nature & Progrès substituted "agrobiology" with "agroecology" in its title. Its journal also contained the translation [83] of an Altieri and Nicholls' article published earlier in the IFOAM journal in which agroecology was seen as the way to rescue organic agriculture from industrial agriculture [84]. Nature & Progrès was also instrumental in the wider appropriation of agroecology by social movements, especially during an international conference on agroecology, "Food, Autonomy and Farming" organized in 2008 in Albi (France), together with other partners (in particular, Friends of the Earth, the Confédération Paysanne and the Instituto de Sociología y Estudios Campesinos (ISEC) [85]. ISEC marked its contribution by soliciting leading scientific figures from its Hispanic network (E. Sevilla-Guzman, M. Altieri and S. Gliessman). This created an explicit link with the powerful social movements and scientific approaches of the Ibero-American world [86]. Conversely, we can observe the absence of P. Rabhi's movement as such. Only a handful of French researchers participated in this conference, and three of them were attached to the INRA-SAD division. This conference, bringing together nearly 300 people, was accompanied by public positions. The journal "Nature & Progrès" published a special issue entitled "Agroecology, a social movement?" [85]. Likewise, Silvia Pérez-Vitoria, a socio-economist from the eco-anthropology department of MNHN, and Eduardo Sevilla-Guzman, a Spanish agroecologist and rural sociologist, co-authored a "Small Handbook of Agroecology" under the auspices of La Ligne d'Horizon [87]. This book is partly based on an earlier issue of the French edition of "The Ecologist" [88]. This political ecology journal had already dedicated special series of articles to agroecology [89] and reported on this successful conference [90].

To conclude, this period shows the role of contemporary pioneers as well as the interconnections and co-evolution between the organic movement and agroecology. It should also be remembered that at the end of the 2000s, the French agroecological movement was composed of different actors following their own specific agendas but whose global vision generally converged.

3.3. Agroecology in Academic Institutions: A Scientific Purification

3.3.1. CIRAD: A Trajectory between Agroecology and Ecological Intensification

As we have seen, some individual researchers played a role in the 1980s in the recognition of the need to reconsider a development path that took agroecology into account, beginning in West Africa. During the 1990s, a change of regime could be seen in the way that agroecology was considered, especially in the case of CIRAD. Michel Griffon was an important contributor, first, to this institutionalization of agroecology within CIRAD, then, to the French academic scene and, recently, to agricultural policy. Indeed, M. Griffon, after a career as an agronomist and economist, director of

a unit on Prospective and Policies, became the Scientific Director of CIRAD in 1999. Appointed to the French National Research Agency (ANR) in 2005, he headed the Department of Ecosystems and Sustainable Development until March 2008, and then became Deputy Director of the ANR where he played a role in the funding of research concerning agroecology [91]. As we will see later, he was also influential during “*Le Grenelle de l’Environnement*”, a political multi-actor forum sponsored by the French President, N. Sarkozy, in 2007 to make some policy recommendations on environmental issues.

For M. Griffon [92], his investment in CIRAD began with his awareness of the importance of environmental issues after the Rio Conference in 1992, which was the international consecration of the Sustainable Development concept. Another important moment for M. Griffon in the evolution of agroecology and, later, his “*ecologically intensive agriculture*” (EIA), concerned his contribution to the conceptualization of the “*Doubly (or Super) Green Revolution*” as a member of a CGIAR panel directed by the system ecologist, Gordon Conway [93]. This concept opened the way for international agricultural research, endorsed by CIRAD in 1995 [94], requiring “*a revolution that is even more productive than the first Green Revolution and even more ‘Green’ in terms of conserving natural resources and the environment*” [93]. This approach acknowledges the need for “new research paradigms”, i.e., first, “the development of molecular biology” and, second, the development of “an ecological approach that, in tandem with economics, sociology and anthropology, is rapidly increasing our understanding of the structure and dynamics of agroecosystems”. There is no criticism of the Green Revolution in this case but, instead, the desire to extend it, using biotechnologies and ecology: “*to move from one approach of agricultural development based on the control of the environment to another, based on a connivance with ecosystems, on taking the variability of systems into account and putting the knowledge accumulated by scientific ecology into practice in agriculture*” [94].

In one of his books, Griffon [92] also mentions “multiform research in the domain of agroecology”. If some textual traces of agroecology in the CIRAD archive exist, particularly concerning missions for cooperation on agroecology [95,96] in the middle of the 1990s. Among the CIRAD research then referred to as agroecology, Griffon highlights the work of his colleague L. Séguy and his team. Indeed, as of the end of the 1980s, these researchers focused on soil conservation techniques, usually under the banner of Conservation Agriculture [97]. As the AVSF president, R. Billaz, ex scientific director of CIRAD, notes, these techniques, when systematically using pesticides, “do not conform to agroecology principles” [98]. Some other agronomists [99–101] also question the suitability and appropriateness of this technological package for farmers, small landholders and African technical culture, whereas conservation agriculture is mainly attached to larger farms and to the agricultural supply industry [97].

The use of the term agroecology can appear to be ambiguous here. Nevertheless, since the end of the 1990s, CIRAD has used the term ‘agroecology’ to designate this work, as in the title of a program report: “*CIRAD activities in agroecology: direct sowing on permanent plant cover*” [102]. The term is also used on their website (<http://agroecologie.cirad.fr/>) and in the names of successive projects funded since 1998 by the FFEM and the AFD, the French Fund for the Global Environment and the French Development Agency, respectively. Indeed, since 1998, the AFD has continuously funded CIRAD projects in Brazil, Madagascar, Cameroon, Mali, Tunisia, Laos and elsewhere [103]. Funded by the AFD, Séguy and his team, associated with C. Bourguignon, developed the “*Global Action Plan on Agro-ecology*” and the “*Multicountry Action Plan in Agro-ecology*” [104]. These global plans are based on many successive national or regional projects, e.g., “*Support project for the diffusion of agro-ecological techniques in Madagascar*” with the Malagasy government and many locally created agroecology NGOs.

The publications of Séguy and colleagues are mainly based on their practical experience and are quite endogenous. Many references can be found to agroecology since 1999, but very few to Altieri (or other leading authors). The first citation was seen in 1999 [105], citing the agroecology principles in Reijntjes et al. [106]. Altieri is cited for his work on the ecological role of biodiversity [107], the second most cited article by French agroecologists, and his definition of agroecology as “*the science of natural resource management for poor farmers in marginal environments*” [108]. Using this definition, CIRAD researchers from this team [109] stated: “*direct seeding mulch-based cropping systems are considered as*

one component of agro-ecology strategy". Indeed, the concern for smallholders and farmers and the arguments Altieri promoted seem to be the main reason for the choice of the term. Another possible reason concerns the establishment of L. Séguy in Brazil at the time when agroecology was making institutional inroads in the country [86] as well as its fleeting appearance in the CGIAR agenda [110]. We can also note the collaborations of Séguy with C. Bourguignon since 1998 [97], a soil microbiologist engaged in agroecology who had ties to P. Rabhi in the 1980s at the first French agrobiological school in Beaujeu [111] and also in the CIEPAD.

In the 2000s, agroecology spread more widely within CIRAD with the support of the AFD. Some researchers developed works considered as agroecology by diversifying the themes beyond soil management, e.g., on agroforestry, on pest management using self-regulating processes and preventive measures in Reunion Island [112], cover crop plants in industrial banana plantations in the West Indies or mixed crop-livestock farming in Burkina Faso. The conceptual framework of CIRAD [103,113,114], directly derived from M. Griffon [92], is composed of two dimensions (degree of ecological process mobilization $\times$ degree of actors and socio-economic organization mobilization), which defines a range of agricultural systems. CIRAD developed research on transitions from "traditional low input" and "conventional intensive systems" to "ecologically intensified systems" by intensifying the use of ecological functions with a high level of socio-economic actors. Some of the names of some CIRAD units also contained the word agroecology: AIDA for "Agroecology and Sustainable intensification of annual crops" and HortSyst for "Agroecological functioning and performances of horticultural systems".

For M. Griffon, the Grenelle de l'Environnement process in 2007 was a window of opportunity to put the need to change agriculture on the political agenda. As a scientific director, he played a major role. The evolution toward Ecologically Intensive Agriculture (EIA), continuing the lexical conundrum, can be understood as the construction of a discursive strategy [115] aimed at enlisting actors. This strategy is based upon the creation of a new oxymoron whose explicit function, as linguists also say [116], is to neutralize conflictualities. Indeed, in 2009, M. Griffon [117] explained his political strategy: "In 1994, we invented a concept called 'Doubly Green Revolution' (...). But Doubly Green Revolution is a term that never convinced people. It was necessary to wait for the Grenelle de l'Environnement Forum, and it was in the office of Mr. Borloo with Mrs. Kosciusko-Morizet, that the issue of finding a term that could mobilize consciences reemerged. (...) and the term 'ecologically intensive agriculture' appeared. We felt that there was a certain acceptance around this term (...). There is a paradoxical meaning. The paradox is that it seems to marry two very different things: classical intensive farming (...) but adorned with the virtues of ecology. (...) To announce that paradoxes can become realities is to force oneself to think. This may therefore appear as a misunderstanding. But it is a misunderstanding that is extremely useful, precisely because it gives food for thought (...) This is called an oxymoron, that is to say, a living contradiction".

This desire to enlist a large set of actors, particularly from the agricultural mainstream and to embrace the diversity of agricultural models was also expressed regarding the partnerships established around the eponym NGO that M. Griffon created in 2010. This NGO was conceived as a forum "reconciling ecology and productivity by establishing a constructive dialogue between all the actors of the agricultural world" [118], i.e., bringing together alternative with mainstream actors who discussed technical and philosophical issues. However, the participation in EIA events over time evolved toward mainstream actors, mainly cooperatives, agribusiness, extension services, some conservation agriculture, and a few environmental NGOs, and the thematic also shifted to technology and market issues.

The political agenda-setting, and the compromise it requires, affected the lexicon and the semantics used and created some ambiguities between agroecology and EIA. The established discourses on the notion show that the concepts are sometimes equivalent and commutable, as in the name of the conference cycle organized by CIRAD since 2009, as well as with other notions, e.g., ecoagriculture, conservation agriculture or doubly green revolution [119]. These concepts were sometimes subordinated to EIA [120]. This uncomfortable situation encouraged M. Griffon to clarify the links, by breaking with the visions of other agroecology actors. EIA is based on an ecological

reductionism [121] focused on ecological processes and services, while leaving the other dimensions embedded in a stronger agroecology, i.e., social and political claims. In an interview made in 2017, he declared: *“the problem when speaking about agroecology is that there are at least three definitions, three ways of understanding. Many students hear about it as the activity of a man who is Pierre Rabhi, and so it is a philosophical conception of life founded especially on agriculture; it is organic agriculture quite simply (...) that it is an agriculture finalized on a kind of cultivated and assumed sobriety. Well, it’s like that, it’s good it’s interesting... There is a concept of agroecology as the ecology of political ecologists, that is to say, a movement of a somewhat ideological character and based on natural techniques without particular theorization but claimed as a movement, as a social movement. And then the last definition that I personally use is: agroecology is ecology, especially taking agricultural problems into account, but it is ecology as science. So there are at least these three ways of seeing things. I use the last one”* [122]. He reinforces this scientist vision of agroecology when dealing with the difference between agroecology and EIA: *“agroecology is above all a science, and must remain a science (...) EIA uses agroecology as a science, to understand the phenomena. And intensive ecology is engineering. It is a set of techniques that modifies and manages an environment that manages an agro-ecosystem”* [123].

Thus, the board of CIRAD and Griffon developed a reformative strategy, reflected in the CIRAD slogan *“working together for Tomorrow’s Agriculture”*, based on compromise and pragmatism. Even if they focused on smallholders, CIRAD has no agrarian preferences like many American agroecologists or rural sociologists and promotes a wide range of systems (big or small, at the farm or industrial level) toward ecologically intensified systems. Goulet [121] describes the EIA approach as the *“art of a quiet break”*. Griffon conceptualizes EIA as a means to reduce conflicts in the world of agriculture: *“The year 2008 saw an inflection in the nature of the conflictuality: the Grenelle de l’Environnement gathered a large part of the protagonists, under the chairmanship of national elected officials. In the moments of dialogue, a rapprochement of conceptions took place around the idea that scientific ecology could constitute the basis of a new technology able to produce more if necessary, while respecting the environment in all its aspects”* [92]. Griffon and CIRAD are also reformists in the sense that they prefer being inside the institutional mainstream, e.g., involved in international scientific diplomacy with the CGIAR or the FAO, as well as at the national level with mainstream actors of agriculture, rather than in the margins. They thus believe in the strategy of compromise-building with strong actors. This art of compromise could be linked to CIRAD institutional culture based on scientific diplomacy and, as a Public Establishment of Commercial Interest (EPIC in French), the necessity to raise funds from international funding organizations.

This strategy also explains the investment of CIRAD in Climate Smart Agriculture (CSA) initiatives seen as a *“wager”* [124]. This concept, supported since 2010 by the FAO, emerged in the climate arena, while agriculture was absent from negotiations, from actors of the agricultural sector now coalesced in the Global Alliance on Climate Smart Agriculture (GACSA) (including fertilizer, seed and biotech industries) [124]. In its diplomatic capacity, CIRAD attempts to maintain contacts between two epistemic communities and with the whole range of actors in the agricultural world, from farmers to agribusiness. Indeed, according to a CIRAD researcher, CSA is a way to be heard by some actors, particularly in the United States where agroecology is considered as overly politically connoted.

3.3.2. Rebuilding French Agronomy with Agroecology

A few years after CIRAD, leaders in French agronomy, i.e., professors and former senior officials of major research institutes, questioned their discipline in search of social legitimacy in the context of extended criticisms about health, environment and global issues related to agriculture. The *“Association Française d’Agronomie”* (AFA) was created in 2008 thanks to a young generation of agronomists from research, extension, or administrative fields, sometimes with explicit affiliations with solidarity NGOs or the Green Party. The AFA became an arena of reflections on the evolution of the profession and the practices of agronomy in connection with society and the environment, as revealed by the name of its journal, *“Agronomie, Environnement et Société”*. The period was characterized by the profusion of books and reflections about the past, the present and the future of the discipline and

the need to reinject it with a new modernity [125–131], where contributions from ecology are a big part of the expected legitimization. Under the influence of these leaders, some agricultural schools also developed European agroecology masters' degrees, first in the private sector and later in the public one.

Many individual INRA researchers were involved in the previous movement, but INRA, as an institution, has been moving towards a paradigmatic shift since around 2005, when G. Riba, then Scientific Director, promoted the transition from "agriculture to Ecoagriculture" at the World Conference, "Biodiversity, Science, Governance" [132]. Ecoagriculture was formerly proposed by McNeely and Scherr [133] and promoted by the IUCN, but also contested by Altieri [134] concerning its use of GMOs and as a "trojan horse" of "multinational corporations". In 2006, B. Chevassus-au-Louis, former INRA director and president of the MNHN, entitled an inaugural lecture, "*Rebuilding Agronomic Research*". At the prestigious school of agriculture (ESA Angers, the cradle of EIA), he called for "*the development of an agro-ecology integrating acquired knowledge and approaches of these two disciplines*" (i.e., agronomy and ecology). Between 2006 and 2009, some INRA units or centers adopted the term agroecology as an identifier. In 2007, Keith Warner was invited to several INRA centers to present his work entitled "agroecology in action" [135], which became the creed for INRA-SAD [136].

The preparation of the strategic INRA 2010–2020 document [137] boosted the inclusion of agroecology in the national research agenda. Interestingly, a brief concept note [138] circulated "*in order to identify some orientations for a reflection on agroecology at INRA*". It included an inventory of possible options and definitions of agroecology. A restrictive definition was then chosen, with broader thematic coverage while operating a boundary work [139] between science and social movements, and thus with historical academic agroecology connected to social movements. Even though M. Altieri was invited to the INRA "Agro-ecology worksite", one output was that: "*Agro-ecology has many meanings, first and foremost a science born in the 1930s, at the crossroads of agronomy and ecology.*" *As of the 1960s, agroecology emerged as a social movement and as a practice (...) with relatively few scientific works (...) We therefore claim the right to speak of "agro-ecology" (with a dash), in order to renew the scientific vision of the interactions and possible convergences between these disciplines*" [140]. In addition to being a "new science", the direction of INRA framed agro-ecology in terms of a "double performance" and economic competitiveness in response to governmental framing [141].

This official position is not unanimously followed inside INRA. Indeed, as revealed in Figure 4, some French researchers on agroecology, particularly from the Agroecology Unit of Dijon, adhere to the social movement/science demarcation and focus on ecology references, whereas INRA-SAD and ISARA researchers maintain the historical and conceptual continuity by citing American agroecologists (from Bensin to Altieri, Gliessman or Francis) and also French systemic agronomy [142]. INRA-SAD researchers, who advocate an "agroecology for action" [136], consider in a systemic and transition way both the biotechnical and socio-economic and political dimensions of agro-ecosystems and agri-food systems. Some other authors, mostly from INRA's Agronomy & Environment Department and CIRAD, are intermediary in their reference pattern, using references from American agroecologists as well as from proponents of ecoagriculture [133], and the debated notions of sustainable [143] or ecological intensification [144,145].

bricolage” that reinforced the effectiveness of the message. The head of the MAAF’s, also a member of the Saint Germain Group, explains the substitution from EIA to agro-ecology: *“One day Le Foll decides to call that agro-ecology (...) he said “EIA doesn’t fit because there’s “intensive” (...) and then he said “agro-ecology, it’s a contraction, it’s still easier to explain (...) We win in public understanding, in the simplicity of the message” (authors’ own translation). Thus, even if Le Foll finally chose agro-ecology, his political strategy is rooted in the Griffon vision [154], while the discourse analysis about EIA also shows this lexical substitution to agroecology since it goes under the conceptual framework of the MAAF [115].*

The adoption genealogy of agroecology reflects, as in Griffon’s vision, the enlistment strategy of a large set of actors and practices [22,154,155]. In their ministerial actor survey, Arrignon and Bosc [155] show that the MAAF strategy is based upon a pacifying and depoliticizing rhetoric as well as an integrative instrumentation. The fuzzy and encompassing use of agroecology is seen as a strategic resource to potentially enlist a larger set of actors claiming various agricultural models and practices. A national press article in 2013 at the beginning of the policy concluded: *“official or not, the definition of agro-ecology is still vague so that everyone attributes what he wants to it” [156].*

3.4.2. Concrete Policy Implementation

The government project for agro-ecology was supported by a Web platform called *“Agricultures: Producing in a different way”*, which was also the title of national conferences organized since December 2012 to mobilize people in the promotion of a policy aiming to *“make France the nation of environmental excellence”*. It can be seen as a response to the challenge of the ecological modernization of agriculture, i.e., *“integrating environmental policy objectives into sectorial policies” [157]. Its intention was to go further than previous policies at the EU level, such as the agro-environmental measures set-up in 1992, and to reactivate the spirit of “Territorial Farm Contracts” also set up under the socialist government in France (1999–2002). The French Agroecology Project (FAP) indeed conforms with existing legal frameworks, but also epitomizes the Law of the future for Agriculture, Food and Forestry (LAAF) (13 October 2014), which “promotes and sustains agro-ecological production systems, including organic production, that combine economic, social, (...), environmental and health performance. (...) These systems favor the autonomy of farms and the improvement of their competitiveness by maintaining or increasing economic profitability, by improving the added value of production and by reducing energy consumption, (etc.). They are based on biological interactions and the use of ecosystem services and the potential offered by natural resources (...), maintaining their capacity for renewal both qualitatively and quantitatively. They contribute to mitigation and adaptation of the effects of climate change” (LAAF, art. I.2).*

The strong political and discursive work (Figures 2 and 3, class 1) carried out by the Minister himself characterizes this policy established in a difficult structural (resistance of mainstream union co-managing agriculture) and economic context (milk crisis). Beyond that personal involvement, the policy is quite modest because of the lack of allocated funds, CAP constraints and the limited strength of its instruments. Indeed, the FAP is mainly an umbrella for previous policies. In 2013, three approaches were embedded in the FAP: (i) organic agriculture, still growing and then supported in 2014 by a national plan (*“Ambition Bio 2017”*); (ii) *“High Environmental Value” (HVE)*, resting upon the environmental certification for agricultural operations, implemented within the framework of the *“Grenelle de l’Environnement”* and managed by several decrees. HVE’s main objective is to promote and highlight the *“ongoing evolutions in agricultural practices”*. It concerns four main themes: biodiversity, pesticides, fertilizer management and water resources, and includes three successive levels of requirements; and (iii) *“Best Management Practices in agriculture”*, aiming to *“reinforce the positive environmental impacts of agricultural practices and to reduce the negative effects, without jeopardizing the economic profitability of the operation”*. These three approaches reappeared during the project with various emphases, also depending on the target public/audience. In addition, outside a regulatory framework, the PAF also promotes development plans for beekeeping, agroforestry, and conservation agriculture, emphasizing the plurality of models and the inclusive strategy of the minister. They all were eligible to answer the Ministry’s MCAE call (Collective Mobilization for Agro-Ecology in 2013),

which was an attempt to establish the GIEE (Groups of Economic and Environmental Interest), the real FAP instrument inspired by Dutch Environmental Cooperatives. By supporting forms of agriculture performing economically and environmentally, bottom-up initiatives and projects were encouraged by the MAAF. They had to include groups of farmers and possibly other actors, with the aim of implementing innovations that can significantly and collectively improve the impacts of farming systems on the environment. Some 477 of them were created in 2018. One assessment of GIEE [158] suggests that they enabled the recognition of a third way, in-between conventional and organic, and of a “rainbow of agro-ecological innovations” (incremental, substitutive, disruptive). In addition to a statement about “a feeling of fuzziness” in relation to means and perspectives, the study also identifies the necessity of valuing the efforts of those who are in an agro-ecological transition, by a market recognition still to be invented (brand, label). This was partly undertaken by the INAO (Institut National de l’Origine et de la Qualité) in 2016, with a view to integrating the principles of agro-ecology in existing origin and quality labels. Apart from the organic sector, the proposal was contested by most of the concerned organizations. The idea was reactivated in another way in 2017, during the second “agro-ecology night” organized by the MAAF. The minister himself attended and advocated the idea among a group of leading firms from the agro-food sector. They advocated forms of contractualization with farmers and suggested having HVE as a flagship for agro-ecology [159].

Another important dimension of French agricultural policy concerns the diplomacy where agroecology also becomes a resource. S. Le Foll, the former Minister of Agriculture, wanted France to be a world leader in agroecology. He thus encouraged French diplomacy to promote agroecology inside the FAO. The French government has been one of the promoters and financial and manpower contributors, with Brazil, of the FAO Global Dialogue on Agroecology since 2014. The group, Friends of Agroecology (G2A), was launched early in 2015. Following the symposium organized by the FAO in September 2014, France set up this group (G2A) in Rome in 2015. It currently includes 17 countries (Brazil, China, Estonia, France, Ivory Coast, Hungary, Iran, Italy, Ireland, Japan, Madagascar, Mexico, Senegal, Slovenia, Switzerland, The Netherlands, and Venezuela). The G2A is an informal and open group, composed of permanent members wishing to support the FAO’s work on this theme, to exchange their national experiences with each other and to develop scientific partnerships. The G2A organized a first public event, a round-table on agro-ecology, in April 2015, making it possible to approach different perspectives on agroecology through the intervention of five panelists. Moreover, France signed bilateral cooperation agreements with the FAO, Brazil, and China. Agroecology was also mobilized during the COP21 in Paris to promote the “4 per 1000” initiative (federating partners from public and private sectors implementing some practical actions on soil carbon storage) that positively incorporated the orphan subject of agriculture into climate negotiations.

3.4.3. Back to Social Movement: Between Mistrust and Adhesion to the Political Appropriation of Agroecology

From 2012 to 2014, during the parliamentary debate on the LAAF and after its adoption, a Collective for Peasant Agroecology (“*Collectif pour une Agroécologie Paysanne*”) emerged and organized many events (open letters to the Ministry, press releases, a conference at the National Assembly). This collective, animated by the NGO “la Ligne d’Horizon”, is composed of social movement actors that were present at the International Conference in Albi in 2008, plus the Rabhi organizations and La Confédération Paysanne, the French branch of La Via Campesina. They advocate returning to “the fundamental definition” of agroecology, i.e., peasant-centered [160]. The collective affirms: “We, organized social movements, associative, unions and professionals, say that a peasant agroecology exists today in France. We are obliged to describe it as “peasant agroecology” to distinguish it from the communication campaign of the Ministry of Agriculture” [161]. It adds: “We are also concerned that the societal project that is leading agroecology is being diverted in favor of an approach that would be content to prescribe more ecological agronomic techniques to an unequal model always based on capitalist profit” [162].

At the international level, the reformative strategy conveyed by governments and international organizations is risky and poorly understood by actors from the agroecology social movements and solidarity NGOs, including AVSF, the GRET and Coordination SUD in France [163]. Indeed, in 2015, an NGO coalition expressed its mistrust about the CSA [164], considered as the “Trojan of agribusiness” and advocated agroecology [165]. More specifically, the CIRAD report presented to the FAO regional meeting in Dakar [166], establishing an equivalence between agroecology and climate-smart agriculture, caused a large outcry from the agroecology movement, including researchers, SOCLA, Food First, La Via Campesina [167–171], which explains the “cooptation” discourse. This event was a turning point for the agroecology movement, affecting its relationship to the CIRAD’s position as well as its participation in the FAO Global Dialogue on Agroecology.

However, some actors in the historical agroecology movement also used the institutionalization of agroecology as a resource to legitimize their action. In this window of opportunity, while sometimes being skeptical about governmental positions, many actors used agroecology as an explicit banner. For instance, NGO members of the “Groupe de Travail sur la Désertification” created a new coalition called “Groupe de Travail sur l’Agroécologie” (GTAE) to share their respective field experiences and contribute to the FAO Global Dialogue.

Consequently, the progressive opening of a legitimacy space, particularly since the political support extended to agroecology, allows the emergence of new actors as well as the structuring of their networks. This is visible on the map of actors on the Web (Figure 5)

Between the two mapping moments (2011 and 2018), agroecology became embedded in a wider range of institutions, e.g., associated with legal authorities (Ministry of Agriculture, FAO, etc.) explaining the greater number of websites in 2018 map.

Among these macro-actors, agroecology was just one of a broad range of other issues, whereas in the previous period, the notion was more at the forefront of the actors’ self-presentation or more explicitly at the core of their action. A kind of thematic dilution inside new and more generalist organizations affected the way we built our map. We thus made the choice to select those macro-actors with a strong influence on agroecology, as displayed in Figure 5, because they are recognized, and thus hyperlinked, by other agroecology actors or because they contribute to agroecology.

The global topology evolved from a strong bipolarity between actors from social movements and those actors more connected with mainstream institutions, to a multi-clustered morphology with higher connectivity and fuzzier boundaries (Figure 5). Thus, the polarization observed in 2011 is less present, especially with the reinforcement of a wide number of intermediate stakeholders (in green and yellow colors, at the center of Figure 5 in 2018). Indeed, there is a core cluster (blue cluster in the upper middle area of the map) consisting of governmental institutions (particularly MAAF, INRA and mainstream professional organizations) connected with specific clusters. Consequently, institutions have gained in centrality, i.e., in control of information, legitimacy or money attribution. On the northwest side of the map, we can see a cluster of actors connected to international dynamics (FAO, CIRAD, AFD, but also more critical actors that depend on funding like AVSF, CARI, etc.). Some organizations (yellow, and greens clusters on the map) previously inside the social movement polarity (e.g., alternative agricultural organizations like CIVAM, INPact, Terres de Liens, called ONVAR, as well as Semences Paysannes) are now more connected to the previous mainstream cluster because the MAAF recognizes their actions in the GIEE or in the “trophies of agro-ecology” (awarding innovative methods at collective and farm levels). The sub-polarities are also more or less connected to each other. Some clusters of actors were reinforced after 2011. For instance, agroforestry actors, strongly connected to those involved in conservation agriculture, are newcomers on the agroecology map, while the French Agroecology Program has developed a specific development plan that makes it possible to develop and structure local actors under two main national associations. On the southern side, the Rabhi/Nature & Progrès polarity is separate from the mainstream cluster and a sub-cluster dedicated to permaculture also emerges as the new radical frontier to agroecology (see also class 3 in Figure 3), partly connected to the Rabhi cluster. This sub-cluster (southeast side of the map) also

developed a network of agroecology trainers, based on a wealth of individual experiences and new organizations (particularly the “Ferme du Bec Hellouin” and “Fermes d’Avenir”).

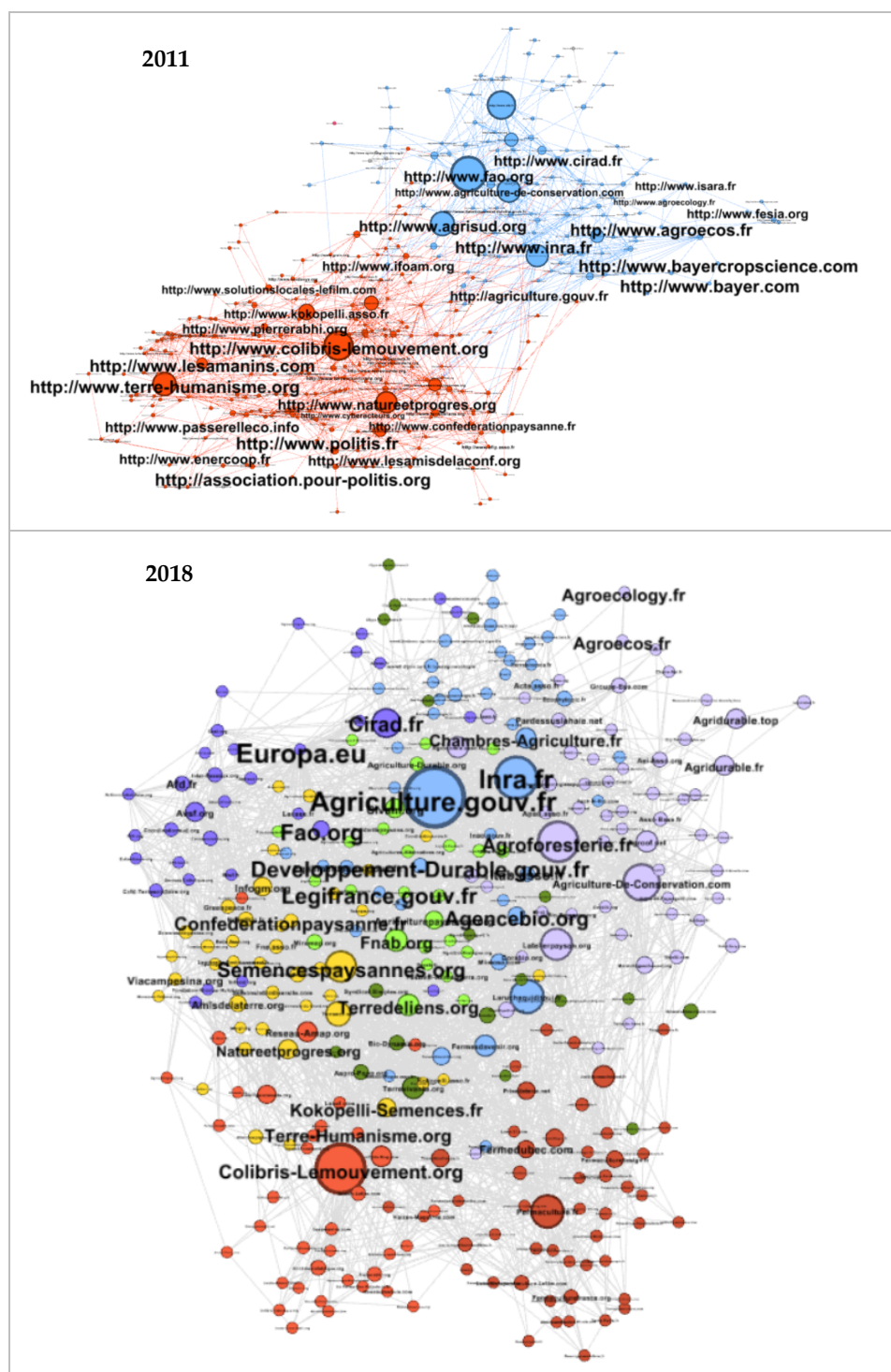


Figure 5. Comparison of networks of hyperlinked websites of agroecology actors in February 2011 (recomputed from data collected for our previous analysis [5]) and February 2018. Selected sites with degree > 4, node size: Betweenness centrality measuring the potential for control of communication flow [172], label size: Pagerank measuring the relative importance of the node in the network [173], node color: Blondel community membership detected with resolution = 0.8, spatialization algorithm: Force atlas. (author: G. Ollivier).

4. Discussion

This journey through the past enabled us to shed light on the roots and routes of agroecology in France. However, it took almost three decades to legitimate-and even legalize-agroecology as research and political programs. Our findings confirm that the term agroecology is understood and used differently by different actors in France. With the idea of multiple performance and the systemic vision promoted in the mainstream conception of agro-ecology in established institutions, France can also be characterized by a technological optimism [174,175]. This tends to overshadow the economic and cognitive dependencies that “high tech” could induce, often led by objectives of productivity and competitiveness. It also tends to minimize the scope of the agroecological proposal by bringing the biological entities to a second level, to the rank of objects and not ecological entities with uncertain behaviors [176]. The issue is not as such about opposing technology and ecology, as in the organic sector [177], but of keeping in mind that these evolutions are not neutral in terms of designing agricultural systems. In addition, the food system dimension of an agroecology program is rather weak, except for AMAPs (i.e., Community Supported Agriculture) and territorial food projects, despite their limited funding. France thus departs from other narratives in agroecology that exist both at the international and national level [21,22].

Although numerous discrete or grassroot initiatives were legitimized within the first call from the MAAF, agricultural policy co-management with the dominant sector reappeared as a key instrument for the orientation of agricultural practices.

The departure of S. Le Foll following the recent French elections and the arrival of a new minister raises the question of the continuity of political support for agroecology, which nevertheless remains inscribed in calls for research projects, even if the proposed frameworks have other objects (climate change, ecosystem services, etc.). Will these dynamics fit the principles of agroecology, reinforce them in their scientific dimension and open new ways of building and implementing a strong vision of agroecology? Its anchoring in social practices (GIEE, etc.) as well as its integration into various training courses (professional and academic) undoubtedly constitute a guarantee of the continuity of agroecology.

However, there are many forms of institutional continuity produced by political, scientific, and associative actors. For example, INAO as well as by actors of mass distribution aim at including agroecological criterion in their market signs, the MAAF also created an agricultural merit of agroecology, and finally a continuity also exists within the INRA direction, whose new CEO, formerly cabinet director of S. Le Foll, promotes the agroecological transition. However, policy cannot be substituted for social movements even less within a five-year time span. This entails counter proposals from social movements to differentiate themselves from an official position.

Beyond an apparent convergence between public and scientific policies, the building of an agroecology project instead results from combining three types of rationalities: scientific, political and administrative [154]. A scientific rationality indeed plays a role in stabilizing a concept and in strengthening the role of research and expertise in public decisions. A political rationality makes it possible to federate various trends and to formulate an original and widely acknowledged project. An administrative rationality contributes to establishing a cross-cutting approach both among ministries and divisions of the MAAF, making the agro-ecological project an integral part of the mandates of civil servants and their skills.

Our analysis also makes it possible to amend the triad model proposed by Wezel et al. [3] who posits agroecology as articulating science, movement and practice. An overly rapid reading of this model tends to oversimplify national situations and obscure the challenge of negotiating these articulations. This model overlooks politics as well as the market, which can also contribute to the recognition or valuation of agroecology within the dynamics of institutionalization. De Wit and Iles [178] propose to consider the institutionalization of agroecology as part of the process of legitimization in a network of scientific, political, civic and practical arenas. They add that each of these

arenas operates according to its own “*credibility tests*”, which explains the diffraction of the meaning of agroecology that we have observed.

5. Conclusions

We have shown that agroecology can be understood with a detailed and historical approach to its uses whose contexts and pragmatic narrative conditions (e.g., location, issues, and actor strategies) make sense and go further than just a focus on normative definitions. Our approach made it possible to detect a longer history of agroecology than is often assumed, as well as a rapid agenda-setting of agroecology in French institutions. It now crosses the entire agricultural sector but is not yet integrated into civil society. New polarizations as well as connections have also appeared in the past few years, as shown by the comparison between 2011 and 2017.

Institutionalization of agroecology results from the intertwining of trajectories of individuals, particularly those from the South, especially as a legacy to our colonial history in Africa. These individuals are engaged in many forms of institutions, from building of organizations to narrative framing through discourses that circulate within institutions. Indeed, ‘agroecology’, as a word, is subject to many semantic interpretations and appropriations, in social movements as well as in dominant institutions, in line with the actors’ interests and some specific socio-historical contexts.

Thus, many meanings of agroecology appeared over time and were used to promote the participation of different publics: from farmers and city gardeners to agribusiness, from organic to conservation agriculture, etc. During the last period in which agroecology was ignored, some government institutions, supported by academic ones, appropriated the notion as a strategy to change a locked-in agricultural sector. To engage a larger set of actors, the academic-policy epistemic community proceeded to a *boundary work* [139], depoliticizing agroecology. Two main visions of agroecology exist on both sides of this boundary, with some internal declinations with a gradual character rather than being strictly dichotomous. Some key features contribute to this demarcation: the integration, or not, of social justice, the role of the market and the integration of a performance lexicon, the emphasis on bio or digital technologies vs. low and appropriate technologies, i.e., providing empowerment not economic or cognitive dependencies [179], and the social target (“farmers “vs. “small land holders”, small vs. large agriculture).

Beyond the French situation, an international dimension is also a dominant trait for most of the actors. This can somehow appear as contradictory with the opportunity for local adaptations and contextuality, but also serves to amplify agroecology when principles and design practices are central. This can also be an asset to redefine bases for international cooperation, including for NGOs. Conversely, the issues of food sovereignty and justice (social, environmental, technological, cognitive, etc.) still appear as secondary in most of the documents we analyzed.

The reduction of agroecology to a multiple performance (economic, environmental, and later social) also resonates with the need to assess the results of agro-ecological practices and systems, as discussed in the GTAE meeting in December 2017. This Working Group on Agro-Ecological Transitions (GTAE) was created in 2016 with four NGOs (AVSF, AGRISUD, CARI and GRET), to develop references on the impacts of agroecological systems, and to contribute to advocacy for the orientation of public policies in favor of agroecological transitions. Beyond classical indicators and evidence, a change of metrics is often suggested, based on an alternative conceptual framework and ad hoc indicators [180], e.g., using those complying with the principles and objectives of agroecology. This entails a shift from an evaluation to a valuation perspective. However, a specific market recognition may be ensured on the short-term by a certification in organics. In France and elsewhere, agroecology and organics are not enemies but are evolving together.

Subsequently, the institutionalization of agroecology results from three main drivers:

- (i) Trajectories of individuals, including actors coming or operating from the South. It is worth noting that researchers sometimes face difficulties with positions that are neither scientific nor activist;

- (ii) Narrative activities to support discursive strategies or to differentiate visions and target agroecology publics;
- (iii) Compromises between actors, and about meanings, in the framework of different social arenas where the notion of agroecology circulates.

Finally, what is the best strategy between reformism, within institutions, and a more revolutionary strategy, acting from the outside? This is the eternal and complex question that plagues historically emancipatory movements [181] and depends on political history, as well as on personal political and theoretical conceptions of change. These conceptions are roughly elicited in the Treadmill of Production/ecological modernization debate and between the neo-Marxist criticism of deep capitalist structure and “the naïve endorsement of market-driven liberal eco-technotopias” [182]. To go beyond these coexisting dichotomized strategies and the possible sterilization of their debates, Geels et al. [182] propose the “reconfiguration” position that focuses on transition processes between agencies and structures grounded in the practices of daily life. We also advocate this kind of position for a dialogue that is attentive to the political as well as the grounded and pragmatist dimension [183,184] and beyond opacifying the myth of each epistemic community. We acknowledge the power of articulating social arenas through a dialogue, and eventually even a dispute that really elicits the competing positions, expectations, and values. Social movements and critical actors are major forces for change in building advocacy coalitions around values and representing some grassroots realities to be considered by mainstream institutions. However, since agroecology is a political phenomenon and politics is the art of compromise, social movements must be able to play the game of negotiation to build some political compromises on a scientific basis. On the other hand, scientists and technocrats should also consider that technologies and science are not socially and politically neutral and that they affect society as well since they are under the influence of competing interests and power struggles [185].

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