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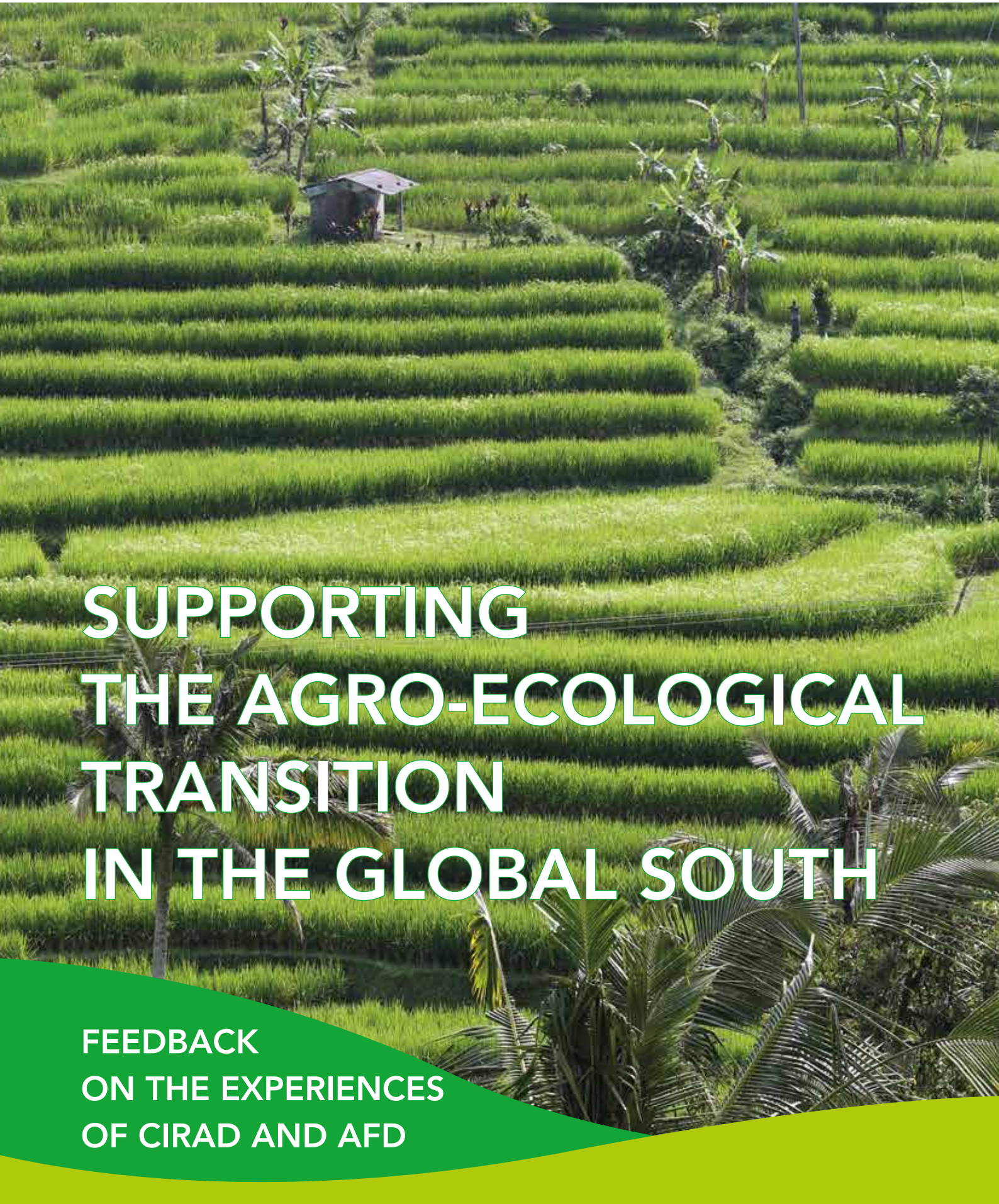


SUPPORTING THE AGRO-ECOLOGICAL TRANSITION IN THE GLOBAL SOUTH

FEEDBACK ON THE EXPERIENCES OF CIRAD AND AFD

Farming systems in the global South face specific challenges relating to population growth, rapid urbanization, climate disruption, State disengagement, the power of globalized agro-industry, and a lack of investment and services.

As a result, they need to innovate in order to develop adaptation and resilience solutions. CIRAD and AFD, together with researchers and agricultural development stakeholders in the global South, are working on research and full-scale trials aimed at documenting the capacity of agro-ecology to provide an economically and socially viable alternative to conventional intensification models.

1 THE LEVERS OF THE AGRO-ECOLOGICAL TRANSITION

For CIRAD and AFD, agro-ecology is:

- **a scientific discipline** that combines the concepts of scientific ecology and agronomy,
- **a type of engineering** based on research results and producer know-how,
- **a contribution to developing sustainable food systems,** by boosting various services (economic, social and environmental) in addition to the production function.

The term "ecological intensification" is used to stress the need to reconcile increased agricultural production with the principles of agro-ecology.

The agro-ecological transition refers to the range of interconnected dynamic processes by which new, sustainable cropping systems based on the principles of agro-ecology are gradually replacing conventional systems.

Based on Michel Griffon's representation (2013), CIRAD and AFD have classed the main levers of the agro-ecological transition along two main axes:

- **the vertical axis is biophysical.** It relates to the growing use of functional biodiversity in agro-ecological systems instead of chemical inputs (mainly pesticides) and fossil-based products. This axis also takes account of the target of improving resource use efficiency (water, energy, soils, etc) and of optimizing biogeochemical cycles within production systems.
- **the horizontal axis relates to organization and institutions.** It reflects the determining role of concerted dynamics involving producers and the whole range of agricultural development players in building agro-ecological systems, from a plot to a territory scale.

The agro-ecological transition is thus the capacity to develop innovative production systems by making use of **biological, organizational and institutional levers.**

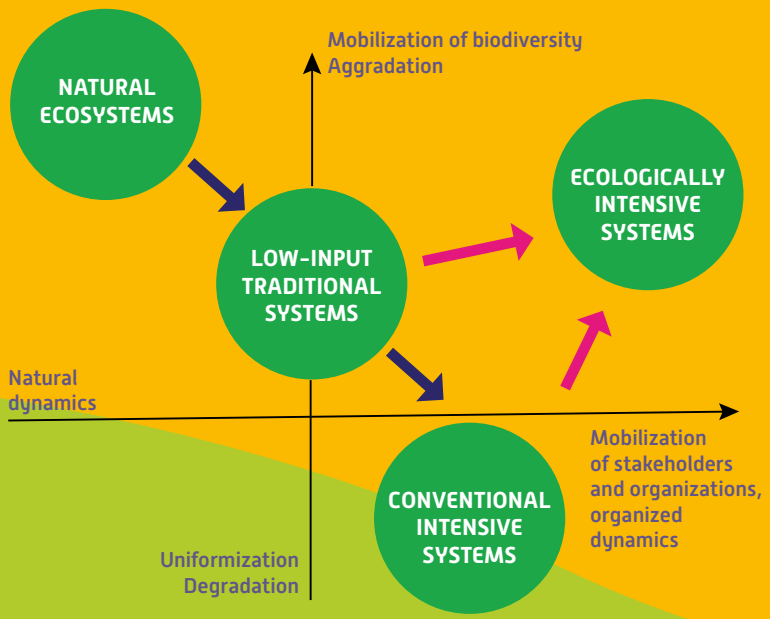
Adapted from M. Griffon, in: *"Qu'est-ce que l'agriculture écologiquement intensive ?"* M. Griffon. Editions Quae, 2013

The agro-ecological transition concerns the various types of farming systems in the global South

In the countries of the global South, ensuring that family farming adapts to the challenges posed by global change is a priority. For most family farming systems, the transition means a direct switch to systems with high environmental and social value, without first trying intensive conventional systems based on massive use of chemical inputs. However, agro-ecological transitions must also apply to production systems based on intensive monocultures with high chemical input use, since the environmental and social sustainability of such systems is under particular scrutiny.

CIRAD and AFD are supporting those involved in the agro-ecological transition in the global South

The work being done by CIRAD and AFD fits into an overall participatory, territory-based research-action approach aimed at co-building several commons: knowledge (scientific and endogenous); partnerships (involving producer organizations, groups, networks, innovation platforms, operators, NGOs, which are playing a vital role in the agro-ecological transition and with which CIRAD and AFD work, notably the GTAE [working group on the agro-ecological transition]; capacity (training, increasing social capital, knowledge development); and lastly innovation processes themselves (with a capacity to go beyond the pilot approach). CIRAD and AFD have conducted several dozen development projects centring on the agro-ecological transition, primarily in sub-Saharan Africa, Madagascar, Southeast Asia, Central America, Latin America, the West Indies and the Indian Ocean.



BIOLOGICAL LEVERS OF THE AGRO-ECOLOGICAL TRANSITION

- Making use of biodiversity within agrosystems (intra- and interspecific mixes, service plants, nitrogen-fixing plants, rotations, etc) to foster natural control of crop pests and boost the range of regulatory services, hence reducing use of chemical inputs, particularly pesticides.
- Maximizing biomass production by intercepting sunlight and fostering carbon capture in plants and in the soil (permanent soil cover).
- Fostering crop-livestock farming interactions.
- Recycling resources and optimizing water and nutrient bio-geochemical cycles to ensure more efficient use and cut losses and pollution (for instance through organic matter management).
- Revising genetic improvement targets to take better account of the interactions between the various species and their environment.
- Managing landscapes by organizing landscape mosaics to supplement regulation.

ORGANIZATIONAL AND INSTITUTIONAL LEVERS OF THE AGRO-ECOLOGICAL TRANSITION

- Developing producer support services in terms of training, advice and technical support, and coordinating them with other services, with research and with other agrifood supply chain operators.
- Boosting the involvement of upstream and downstream supply chain operators (supplies of inputs and suitable mechanized equipment, of seeds, etc), studying consumer requirements and expectations within a short- and long-term forward-looking vision, fostering product marketing, and developing standards for recognizing goods produced in systems with high environmental and social value.
- Developing capitalization, teaching, knowledge transmission (scientific or drawn from producer practices), use of feedback on experiences, producer training (peer-to-peer, demonstrations, trials).
- Fostering political and institutional commitment to guarantee support for local and territorial initiatives through appropriate policy and legal frameworks (laws, regulations, and economic, financial and tax instruments).
- Respecting the range of producer strategies, including on a local level, and encouraging the active participation and voluntary involvement of producers in changing their systems; in this respect, the existence of forms of local collective action and management methods for material commons (nurseries, seeds and animals, water, land, pasture and forest cover resources, etc) and immaterial commons (knowledge, information, social capital social, etc) is a powerful lever.

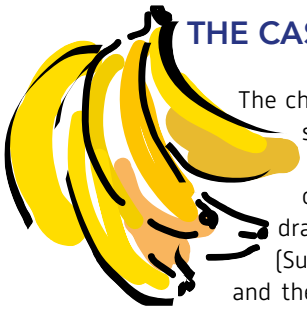
2 FEEDBACK ON EXPERIENCES

More than ten years spent conducting experiments and supporting development projects have enabled CIRAD and AFD to pinpoint the generic conditions for successful agro-ecological transitions:

- **inclusion,** which puts producers at the heart of the debate and innovation process and which must focus more on the specific role of women;
- **contextualization,** since the agro-ecological transition cannot be seen as universal or homogeneous, or expected to happen overnight; on the contrary, it takes many shapes and forms, and is site-specific (local, territorial or regional), sometimes sector-specific (supply chain) and dependent on the local context and local constraints and opportunities;
- **scaling,** which means organizing gradual stages of co-design of new systems;
- **opening up,** encouraging producers to interact with other local players so as to identify the measures required to support the transition; this process is a fundamental part of skill building;
- **institutional structuring,** within formal partnership structures (innovation platforms and networks, technical advice, other networks, etc) and specific tools (demonstrations, experiments, role play, adaptive modelling, etc) to foster exchanges;
- **public action,** which is vital for supporting transitions (political, legal, regulatory and financial frameworks, economic instruments;
- **capitalization and transverse analyses of experiences, dissemination of results and experience sharing,** to ensure that contextualization is not an obstacle to transition, and that the principles and general rules of transition are combined with specific instruments for local implementation of solutions.

Switching from intensive conventional monocultures to multi-species systems to reduce environmental impact

THE CASE OF WEST INDIAN BANANAS



The chlordecone crisis, the subsequent social and political pressure and a move on the part of the supply chain and producers resulted in the drafting of a "Plan Banane Durable" (Sustainable Banana Plan). Producers and the research sector already had a varied technical package resulting from previous innovations (in vitro plantlets, biological control of weevils, etc), and had developed multi-species systems and service plant engineering operations. These solutions have very significantly reduced pesticide use. Environmental performance indicators have been developed. A dedicated innovation platform and technical institute have been set up. The plan is led by the supply chain and producers, CIRAD, the Guadeloupe and Martinique Regional Councils, the State and the EU.

▲ **COVER PLANT, *CROTALARIA SPECTABILIS*, IN A BANANA PLANTING**
© Hoa Tran Quoc/CIRAD

Developing agro-ecological systems to satisfy food demand

▲ **UPLAND RICE LANDSCAPE IN MADAGASCAR** © J. Dusserre/CIRAD

UPLAND RICE IN THE HIGHLANDS OF MADAGASCAR

In the central plateau region of Madagascar, population growth and increased demand for rice led farmers to grow rice under upland conditions, to supplement irrigated lowland production. They ran up against problems of fertility and pests (weeds, fungal diseases, soil insects), with limited access to the means of conventional intensification. CIRAD and its partners, with the help of AFD, have worked with them to find agro-ecological intensification solutions, making use of three technical levers: breeding rice varieties suited to upland conditions, improving soils, and practising conservation agriculture using service plants. A wide range of possible solutions is on offer, which is enabling many of the country's poorest farmers to produce food crops in a sustainable way.

Adapting to climate change and market evolutions

COFFEE-BASED AGROFORESTRY SYSTEMS IN CENTRAL AMERICA

The global coffee price crisis of the 2000s triggered deep social crises in Central America. Producers turned to more protected markets that were also more restrictive in terms of environmental protection. CIRAD and its partners have looked into two complementary solutions: on the one hand, they have studied the links between different agroforestry practices (species selection and management) and associated ecosystem services in coffee plantings, and on the other, they have created new coffee varieties. Technical options based on competition between species have been tested within producer networks. Local innovation platforms and payments for environmental services have been introduced. National laws to promote agro-ecology have been adopted and private firms have developed environmental labels and quality clusters.

▲ **COFFEE PLANTING UNDER TIMBER TREES *(TABEBUIA ROSEA)*** © B. Rapidel/CIRAD

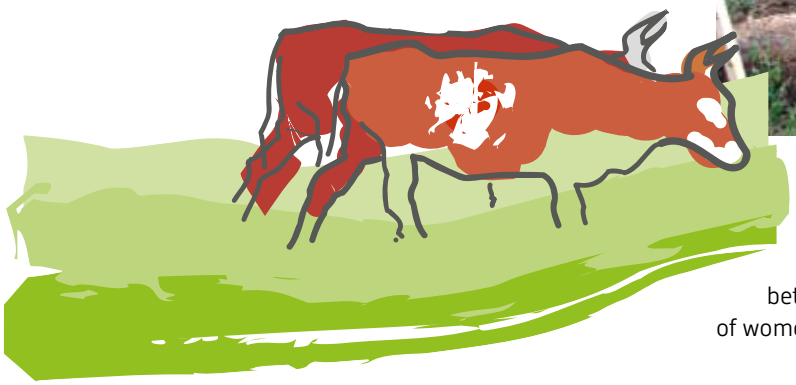
Responding to increased local demand and land use pressure

POLYCULTURE-LIVESTOCK SYSTEMS IN WESTERN BURKINA FASO

In the cotton-growing savannah zones of western Burkina Faso, researchers, development players and producers have worked together to help polyculture-livestock systems make the agro-ecological transition, by encouraging the association of crop and animal farming on a plot, herd, farm, territory and supply chain scale.

Innovative techniques for organic fertilizer management (field pits), growing fodder crops alone or intercropped with cereals (velvet bean, cowpea, fodder trees) and more intensive, integrated mixed systems (dairy and beef fattening workshops), and local territorial governance structures have been developed. Recent studies have assessed their initial impact: increased production, better closure of nutrient cycles within agro-ecosystems, inclusion of women and young people in local value chains, etc.

▲ **FERTILIZER PIT, BURKINA FASO** © M. Laurent/CIRAD



Combining local and regional approaches

SUPPORTING THE AGRO-ECOLOGICAL TRANSITION IN LAOS

The hills of northern Laos are rapidly opening up to agriculture. Maize and cassava, which have a particularly strong impact on the environment and health, are developing. This means mechanized, highly erosive soil tillage, anarchic use of herbicides and high rates of chemical fertilizers. CIRAD, AFD and their partners have launched two projects to support the agro-ecological transition in these regions, where agrarian dynamics are largely determined by private supply chain operators. The first set out to foster participatory drafting of land use plans on an agricultural community scale, incorporating innovative agro-ecological practices; it involves capacity building among extension staff and suggests a novel method to monitor and assess the resilience of agricultural communities as regards external events (economic, climate-related, etc). The second, which is more wide-ranging, aims to generate and share knowledge in the field of agro-ecology, and to boost the credibility of the agro-ecological movement as regards policy-makers and consumers in the region.

FIELD TRIALS, LAOS
© P. Lienhard/CIRAD
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Promoting "healthy" vegetable production

A PRODUCTION LABEL FOR VIETNAM

Reducing pesticide use satisfies consumers' demands but increases producers' costs. To allow them to benefit from higher prices, they are being offered outlets and specific labelling as part of research and development projects. "Healthy" vegetable producer groups around Hanoi are one example.

▲"HEALTHY" VEGETABLES ON SALE AT A MARKET, VIETNAM
© P. Moustier/CIRAD

3 THE CHALLENGES TO BE TACKLED

Three key questions must continue to be documented:

- How, from a technical and organizational point of view, is it possible to switch gradually from conventional agriculture to agriculture based on the principles of agro-ecology?
- What is the cost/extra cost of the transition and what mechanisms are required to allow for that cost?
- What specific types of support are required in the global South as regards the agro-ecological transition?

A range of operations must be continued to this end:

- Boosting knowledge of the ecological mechanisms of regulation
- Building methods and capacity for multi-criteria and multi-scale assessments of system performance in order to characterize the relevance and the economic, social and environmental impact of potential solutions and assess the compromises required
- Paying greater attention to labour productivity and to improving working conditions, since the agro-ecological transition is often labour-intensive and based on practices that involve taking extra care of crops

[...]

[...]

- Developing participatory ways of building crop management sequences and production systems
- Recognizing the vital importance of territories in the agro-ecological transition, and particularly looking into the potential compromises and synergies between the different production models and practices that co-exist within a territory, so as to draft policies that support their co-existence and transformation pathways
- Assessing the merits of agro-ecology as a way of adapting to climate change and contributing to mitigating greenhouse gas emissions
- Capitalizing on the knowledge gained from the various experiences of agro-ecological transition in various contexts in the global South
- Building an overall approach encompassing the challenges of agricultural production, public health and territorial development, with a view to establishing new food systems.

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