



eip-agri
AGRICULTURE & INNOVATION



EIP-AGRI Focus Group

Climate-smart (sub)tropical food crops in the EU

MINI PAPER 3: Training and sharing experience identifying limiting factors for knowledge exchange between researchers and farmers.

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INTRODUCTION - MOTIVATION

This mini-paper focuses on the need for training and knowledge exchange on climate smart (sub)tropical cropping systems.

It first describes a number of identified needs. Then, existing best practices are described on knowledge exchange between small-scale diverse farms, organic farms and conventional farms, and on knowledge exchange between continental Europe and its outermost regions. Finally, we present the following table with the identified needs and how to answer them.

This mini-paper aims at discussing the following needs:

NEEDS	ANSWERS
Solve the problem of lack of information available for farmers and technical support on how to integrate vegetables and trees, animals, and crops in the same area, following a systems approach	Disseminate the results of the research, regarding agricultural information. This could help the development of the agricultural applied research projects; scaling is also needed as well as knowledge exchange.
Identify the reasons why agroecological practices are usually limited to small-scale diverse farms.	Research work results permit to promote agroecological practices from small-scale farms transposable to larger conventional agriculture. This approach will allow to incorporate an evaluation of economic viability of agroecological practices of the farm production. This will permit to transfer their sustainable practices from small scale to conventional agriculture.
Identify why Small-scale farmers do not have access or limited access to EIP funding's and/or are not included in EIP Projects of EU.	Implement EU special and proper funding to provide EIP projects providing them access to EU funding's. in a smart adaptation to climate changes.
Enhance communication to consumer and society at large on the farming activity and on farmers' role in providing safe and healthy products.	Eliminate the gap between the farmers and consumers, and enhance the consumers' support to local farmers. The adoption of more environment- friendly agricultural practices, such as organic farming and/or agroecological practices, mixed farming, and agroforestry. Also improved advertisement of quality of local production with a smaller ecological footprint will help.
Deisolate farmers that are alone dealing with their daily problems related to food production	For instance, in French Guyana remote areas are difficult for on-site technical support with availability of information. So, a farmers advisory service that makes use of technology to virtually connect to remote farmers is needed. For that purpose, it is important to create online advisory systems.
Research needs to address farmers' practical problems.	Establish stronger links and improve farmers' engagement to contribute to a better definition of research needs from practice. A better targeted research to better address farmers needs is necessary. Improving farmers' access to research institutes and universities and ensuring that research is driven by farmers' needs with their participation on the formulation of the research goals.

A new territorial approach that ensures the coordination of several factors to reach food production in an environmentally sustainable way and toward a circular local economy closing the food production chains and diminishing the ecological footprint.

This could be implemented by sharing information:

- i) about the practices, tools, and strategies to increase ecological services of the farms (agro-eco-services).
- ii) about subtropical crop genetic resources, showing its advantages and disadvantages in cultivation under agroecological practices.
- iii) about how to scale-out some good agroecological practices contributing to increase ecological services of the farms.
- iv) about linking consumers to farmers, improving the consumption of the local food production.

DISSERTATION

Is there knowledge exchange

1. There are several examples of how to facilitate knowledge exchange between small-scale diverse farms and conventional farms that address the problem of lack of information; technical support; scaling and different farming system approaches (local production traditions, organic, intensive).
2. Examples of food production methods or approaches on Organic Farming¹ (OF) including a brief overview of agroecology¹, and its practices adapted to Outmost Regions (OR). As a way to reach, it will be necessary to describe the structure and components of the agro-system and food production and the structure of the services provided by the agriculture/ farms: ecological and environmental; provisional; socioeconomic; cultural and regulatory.

Some examples of the absence of knowledge exchange and its consequences are:

1. Most farmers are not aware of agroecological practices. To increase knowledge sharing, pioneer farmers should be taken out of their "niche" and show to their peers how they have innovated. For instance, nowadays in Azores and Madeira islands, organic farming is one of the production systems that deploys agroecological practices and those organic farmers are an example of how agricultural production can move away from the use of chemical inputs to others.
2. Another example is the application of chemical treatments to some important pests and sometimes the farmers does not even know the pest that against which is applying the pesticides (example: olive fruit fly) and the implement of IPM practices will help so solve this creating an extension service to support the farmers. That was implement by the university and agricultural services in Azores to the olive farmers at Terceira Island.

State-of-the-art of research/practice:

1. Examples of description and solving of other problems in other countries of knowledge exchange between small-scale diverse farms, organic and conventional farms.

2. Examples regarding the research inputs and practices of AE (Agroecology¹) and OF (Organic Farming¹) small-scale agriculture. Highlighting the strength, opportunities, and weakness of AE and OF small-scale agriculture as one start point to fundament the research needs and if possible, making a comparative evaluation of current situation of state of art and practice in the OR.

Existing best practices in different regions:

1. In **Guadeloupe and Martinique**, small-scale farmers were not receptive to innovations from larger farmers and vice versa. It is better to promote exchange of information and innovations between farmers that share similar farm sizes or similar production systems or models.
2. The **banana sector in Guadeloupe and Martinique** has reached a high level of agroecological practices by gradually and systematically implementing good practices.
3. **Agroforestry** can be a sustainable and profitable option to increase high quality products such as bananas. In the following picture there is an example of banana grown in combination with other plants in a **Tunisian oasis**.



4. **In the Azores and Madeira**, the use of traps and attractants in banana production allows farmers to better control the intervention decisions for phytosanitary problems (Following figure examples for *C. sordidus* - banana weevils and trips- INTERFRUTA, CUARENTAGRI and BIOMUSA projects). This allowed to change the usual practices into more agroecological and environment friendly practices, and to reduce the use of chemical products to a minimum.



5. **In Madeira**, the organic banana production reached 23.1 hectares, that means 2.3% of total land area under this culture (DREM, 2018), and shows an increasing growth in the last years. The protection of organic production against *C. sordidus* and *trips* is obtained with the use of commercial

or artisanal traps (above figure). These artisanal use of parts of the pseudo stem as a way of attracting the banana weevil. They also use Suffer and predators and parasitoids from the auxiliary fauna to fight against other pests, and even bacteria such as for example *Bacillus thuringensis* against the banana caterpillar.

6. **In Azores, Madeira, Canary Islands and Cape Verde islands**, there were some cases of exchange of knowledge from research that permitted to technicians and farmers to apply new knowledge and skills in the development of their business. The figure below shows an example of the field formation from the PERVEMAC II project in Cape Verde.



7. Also in **Madeira, Azores and Canary Islands** projects such as CASBio, AHIDAGRO, FRUITMAC and VERCOCHAR, help to develop knowledge related to sustainable agriculture and agro-systems and crop adaptation to climate change. This knowledge and expertise were spread to technicians, farmers, and consumers through practical courses in organic farming, workshops and webinars taught by the University of Madeira. The Madeira agricultural school also promoted short training courses on different fields allowing actualization of farmers skills (photos below that show some examples of training and techniques used).



8. Organic Farming in Madeira is also a success story. It allowed many organizations to overcome their scaling limitations. The strategy of Madeira for organic farming has been set up in 1994 by the Regional Government. During this period, at least two Farmers Associations were involved in the promotion of organic farming. There were more than 120 organic farmers and the land area under organic farming reached almost 250 hectares. The major organic productions concerns fruits as banana and other tropical fruits, horticulture, including subtropical crops and aviary species (chickens). Madeira's organic production is not sufficient to satisfy the local consumers demands. This strategy permitted several farmers to sell their organic production in local markets and stores, or directly to final consumers or to restaurants and hotels. Some hotels, like the Biohotel Quinta da Serra in Jardim da Serra, now grow their own organic farm products to serve guests local high-quality food products. An organization, Organica, has been created to promote the consumption of organic products.

Recently, the sector has attracted the attention of national and international organisations. These organisations supported organic farmers by setting up virtual platforms to organize their production virtually. Conventional farmers who want to convert their farms to organic production systems, receive support from official agricultural services of the Regional Government. Since 2012, this support has been reinforced by training technicians in a 'Technician Course on organic farming' organised by the University of Madeira. This training course was established to facilitate the transfer of knowledge and to develop skills among technicians, farmers and consumers on more sustainable, environment- friendly production practices. Thanks to this training course, some Organic Farming Technicians entrepreneurs started their own projects in organic farming, permaculture or agroforestry and mixed agro-systems¹ (photos below).



9. Coatis, a tool to communicate and facilitate the sharing of knowledge and experience, within RITA, a large network in the French overseas territories (<https://coatis.rita-dom.fr>)



Sharing each others' experiences, whether good or disappointing, is essential to facilitate and accelerate innovation. To this end, France's overseas territories have set up a tool, called RITA (outermost regions research and innovation platform) for all the actors in the agricultural innovation chain in these territories: institutional, research and experimentation, teaching and training, development and production.

The French Ministry of Agriculture delegated the national coordination of these networks to CIRAD (agricultural research and international cooperation organisation) and Acta (network of agricultural technical institutes). The Pacific territories (Wallis and Futuna, French Polynesia and New Caledonia) joined the dynamic in 2018 and more than 150 structures (individual farmers not included) are now involved in the RITA.

The challenge was to enable these RITA structures, established in territories that are sometimes at opposite ends of the world, to share, communicate and build knowledge in order to respond to the agronomic issues that these territories often share. In addition to seminars, workshops and study tours organized in Paris or in overseas territories, CIRAD developed a centralized information system that still gives each territory its own autonomy and identity: **Coatis**. It is the RITA's information system. It consists of a homepage giving access to the sites of the overseas territories, and to all the documentation stored in various databases: Directory,

Agenda, News, Library, Media library, Tools for the agronomist, Projects. The different databases are linked, allowing hypertext navigation throughout the information system.

Coatis also allows to generate real private collaborative workspaces, allowing to limit the access to certain documents, including documents under collaborative construction, to a community of selected people. These spaces are dedicated, for example, to a regional research and development project, to the organization of events or to a thematic working group transversal to several territories (Beekeeping, Agroforestry, Soil fertility management, etc.).

Today, Coatis includes 500 experts in its Directory, nearly 1,000 records in its Library and has about fifty private collaborative spaces.

Tools:

1. Facilitate transfer information to farmer's and sharing. Not only transfer information "top-down", but also co-creation of knowledge between researchers and farmers and other actors of the production chain could be considered.
2. EC proper funding will be important to develop the right tools to facilitate transfer and sharing information from farmer to farmer.
3. Make the necessary adaptations Adaptation of the production systems to a different farm scale. The realization of collaborative assays between research and farmers in demonstration parcels on different farms scales in the different regions will be the way to follow for example in banana production.
4. Implementation of sustainable and environmentally safe practices, avoiding the use of chemical fertilizers and pesticides.

CONCLUSIONS

1. To facilitate the exchange of research results and information from farmer to farmer improving the adoption of better agroecological and sustainable measures for production, it is necessary to create a better knowledge exchange between farmers that use different scale production models in different countries.
2. To accomplish the exchange of knowledge between the research and education sector and agricultural producers it is necessary that technicians and farmers develop new skills for the sustainable development of their businesses.
3. There is a global need of increasing the adoption of Organic farming in small-scale farms and even on greater agro-systems.

RESEARCH NEEDS

Knowledge gaps to be covered by Research

Knowledge gaps	Research Needed
A great part of the farmers applies pesticides without knowing even the pests that affect their cultures and their susceptibility to chemical agents used	Monitor tropical fruit crops phytosanitary problems in the different regions. Improve transfer information from monitoring of pests and diseases in the different tropical cultures of the several regions to farmers.
	Implement of IPM techniques at farmer level with the support of agricultural or extension official services.
	Improve farmer knowledge regarding the preservation of beneficial fauna present in farm fields.
	Improve the transfer and exchange of knowledge from research to the farmers.
Increased knowledge about agro-systems sustainability under Organic Farming	Implementing techniques and practices to promote sustainable use of soil nutrients and local farming resources.
	Evaluation and quantification of the services provided by farmers/farms and reflection in food production prices.
	Developing and implementing an assessment methodology allowing making an easy analytical economic balance and evaluation of the organic production process.
	Develop of new approaches and techniques promoting food production diversification using local genetic resources and crops.
	Develop of local resilient food system and chains to decrease ecological footprint and improving the circular economy.
Implementation on the ground of research results regarding improving the benefits of the agricultural systems	Improve the resilience to climate changes of the agricultural production and make the activity more economic and environmentally sustainable for the farmers.

Knowledge gaps	Ideas of actions	Type of actions	How to be developed
How to share knowledge around developing low-input crop production tropical crops?	Because is very important to link transfer of knowledge from research to the farmers is mandatory to develop new tools and methods that encourage knowledge exchange within ORs and between ORs and continental EU	OG	Develop a transversal web platform between ORs and continental Europe Example in Canaries Islands: at regional level, have a web platform with different actors dealing with some specific issues (knowledge between farmers but also administrative tips between managing authorities and farmers) including production procedures in different soil-climatic contexts Examples of solutions in different contexts for small-scale diverse farms, organic and conventional farms.
How to share information around the services provided by the different tropical systems?	Investigate new practices that have less environmental impact and lower carbon footprint linked to knowledge exchange.	Research need	Through the development of new research projects aiming to quantify the impacts of tropical systems on carbon footprint, local food self-sufficiency in ORs, maintaining natural areas. Consider a circular local economy closing the food production chains while reducing the ecological footprint.
Lack of implementation /dissemination of research results improving the benefits of the agricultural systems, in particular organic farming and low-input farming in different tropical areas	Use of legume crops: are they used in traditional systems / Outermost Regions systems? Same for compost and other practices than might not work in OR.	Research need	Implement demonstration parcels to farmers using traditional systems with legume crops Demonstration parcels using Compost as the single way of fertilize these traditional cultures
Why farmers apply pesticides without knowing the pests that affect their crops and their susceptibility to chemical agents used	Research topic regarding reducing applying of pesticides (see F2F strategy) New pests and diseases related to climate change: Those pests and diseases can be very harmful for some products. Collaboration at international level	Research need OG	Investigation practices not using pesticides, to be used to solve phytosanitary issues. To have some specific information to growers about specific new pests. Some farmers do not want to access the information researchers are giving through OGs in some cases. To see how to organise research in situ in some areas where those pests exist already to anticipate

	(between research institutes) is very important.		the issues coming to Europe.
Lack of concrete and practical information available for farmers and technical support	<p>Have a common methodology about sustainability indicators that should be able to compare different systems (environment, climate change, resilience and social aspects...).</p> <p>Independent assessment as a way to make comparative analysis between different practices and then possible to identify good practices for which conditions.</p> <p>Gain of independent knowledge that would be easier to share (re. the reluctance to share knowledge).</p> <p>Easier to guide policy makers and how it could be extended in different areas.</p>	Research need	<p>Establish a common methodology about sustainability indicators to compare different systems</p> <p>Implement an Independent assessment to identify good practices</p> <p>Research is needed about the combination different systems to solve a problem.</p>
Identify ways to disseminate and scale-up agroecological practices, that are usually limited to small-scale diverse farms.	Sustainability tempted to lose the economic and social aspects, and those two are very important.	Research need	To support with science the results of changing practices
Enhance communication to consumers and society and affirm farmers' role in providing safe and healthy products.	Main concern / complain from farmers is that they couldn't really prove to consumers how much efforts they put into their products	OG	<p>To reduce the gap between farmers and consumers adults and children: to bring these consumers to the farms by creating demo farms, where consumers could be involved in the work in a way. The consumers would receive a kind of gift from what they have done and will probably buy some products.</p> <p>Children have a role to play: education. Sharing knowledge not only between farmers but also between farmers and consumers. These children will make the link between them.</p>

Innovation brokers involvement	To have innovation brokers linked to advisory systems.	OG	It would be interesting to have advisory systems with another scope and include the innovation brokers together. AKIS strategy needs to be developed in the different Member States, where advisers will be very involved.
Collaborative aspects	To make the applied research really linked to the farmer's needs.	Research need or OG	Need to take into account all farmers, not only those having access to the internet. Put in practices the concept of Living Labs Set up a network of cooperative farmers that get in touch with research. Online platform

Summary of research needs from practice

1. Better knowledge of mixed crops systems and mixed crop-livestock
2. Better knowledge of sustainable and environmentally safe practices in agricultural production in tropical climates (dry and wet)
3. Solving the major phytosanitary problems that affect tropical fruit cultures in the different climatic zones, by implementing IPM practices (biotechnical, biological, and cultural practices) focused on small areas and farmers
4. Creation of a forecast and early detection advisory agricultural services with the diffusion of warning alerts to the farmers regarding modelling and prevision of the important problems that can destroy their tropical fruit cultures
5. Better study and monitoring of agro-systems sustainability in different OR and increase the knowledge about those agro-systems production procedures regarding environmental sustainability under Organic Farming.

IDEAS FOR INNOVATIONS

Ideas for innovative projects /solutions

Ideas	How to be developed
Investigate new practices that have less environmental impact and lower carbon footprint linked to Knowledge exchange.	Through the development new projects aiming to have less environmental impact and lower carbon footprint.
Promote alternatives to the use of chemical fertilizers	By using compost, biofertilizers or N-fixing crops (for instance, introducing legume crops or using the rests of the existing crops and cattle manure).
Introduce rotation and intercropping as a way of diversifying production and increasing farmer's income.	Through the diversification of cultures, introduction of new varieties or implementation of mixed crops systems (ex. Agroforestry), based on existing good examples.
Use the knowledge exchange to promote the use of local plants in agroforestry systems.	Use of local varieties that are better adapted to the environment.

Potential EIP Operational Group topics

1. Operation Group regarding the Implementation of IPM practices in tropical fruit production farms.
2. Operational Group for monitoring tropical fruit crops phytosanitary problems in the different regions and maintained for a long period.
3. Operational Group for study and monitoring agro-systems sustainability in different OR and increase the knowledge about agro-systems sustainability under Organic Farming.
4. Operational Group to develop a digital platform than can be used by small farmers to get advice on agroforestry, biological control, composting, mixed cropping etc. Ensuring the interaction between different platform's already existing with information from all the countries involved and create the possibility of individual technical advisor to cooperate with farmer's in agricultural knowledge transfer.

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