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AGRICULTURE & INNOVATION



EIP-AGRI Focus Group

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

MINI PAPER 4: Value chains and channels for EU (sub)tropical crops and the role of the development of adequate processing facilities

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1 Introduction

This mini-paper deals with the evolution and current situation of value chains of key (sub) tropical crops in the EU (outermost (OR) and mainland/continental (MR) regions). It is widely recognized that mainstream large value chains co-exist and operate alongside with short value chains with local orientation, while a wide variety of other types of value chains lies in-between these two types. Likewise, formal value chains coexist with informal markets. Each type of value chain is characterized by different dynamics and arrangements among involved actors, which yields various considerations regarding their required interventions and future prospects.

In Southern Europe and ORs, competition of (sub)tropical crop production with third countries is high. Due to the dry climate in Southern Europe, certain fruits can be produced using small amounts of pesticides. A certification scheme of local and low-input products from continental Europe could thus be an alternative to the conventional market. Consumers would need to be involved in such a process. Up to now, at European level, there is a label to differentiate the productions of the ORs, which can be used by various actors, including local farmers (Figure 1).

The importance of this mini-paper lies in the following issues

- The European agro-industrial model applied to our subtropical regions has gradually made technologies disproportionate for agriculture on a human scale. We note a disappearance of the know-how within the farms at the level of processing of the products. While it was common in years when trade was limited with the outside world, especially for the Overseas Islands.
- Important products and crops do not receive the remuneration they deserve in mainstream markets and value chains related to their multifunctional roles e.g. support to employment and cohesion of local societies in outermost regions.
- Quality products from outermost regions and/or sub-tropical products in mainland Europe are not adequately labelled, certified or recognized and do not reach consumers with specific information regarding origin, quality characteristics, production practices etc.
- Local markets (short value chains) sometimes do not provide adequate room for well-developed value chains, while products from outermost regions are burdened with excessive costs which reduce their competitiveness in mainstream markets.
- In outermost regions, there is a surplus of fruits and vegetables at the times of the year when production peaks. This surplus is very little processed and preserved while imports in periods of low production of fruits and vegetables are required. The development of small processing workshops adapted to agriculture of outermost regions will reduce imports and relocate consumption to local production.
- Processing on the farm directly by the farmer and the development of local industries is a way of adding value to this surplus production and will allow him to regulate his sales throughout the year. In this context, local processing units can play an important economic role in adding value to local production with relatively low costs of transportation and trading practices based on mutual trust and personal relationships
- Local consumers and passing tourists are fond of processed local products even though they are sometimes more expensive than imported industrial products.
- Farmers (Smallholders) are usually the weakest links in globalized value chains and so are small actors (small processors, local retailers and traders). In addition, local production faces severe competition from global supply chains and cost-effective global producers/traders/retailers.
- Growing tropical species in temperate climates from continental Europe stand as an opportunity to develop novel competitive value chains.

2 State of the art and key issues affecting the performance of value chains in outermost regions and/or sub-tropical crops

2.1 A large diversity of value chains

Innovative value chains are keys to create added value for the products of multifunctional agriculture. There are several examples of well performing or emerging examples of such value chains

- With the Covid situation, some growers' organisations who were originally selling most of their produce through mass retail distributors have organised themselves for direct selling, in Guadeloupe and other ORs.
- In some ORs like Reunion Island or Guadeloupe, farmers have developed a **Community Supported Agriculture (CSA)**, providing vegetable and fruit baskets to consumers who come to the farm on a weekly basis. These farmers are mainly oriented in rearing local livestock breeds and cultivate local (well-adapted) varieties and thus contribute to environmental resilience and biodiversity protection. Through their direct interaction with consumers, farmers provide information about the quality of their products and their practices, while they also benefit from the whole value added of their products.

"L'ilôt Paradis" - Sandrine Baud's farm in Reunion Island (member of the FG)

After farming for 20 years, working with sugarcane, Sandrine rented a new parcel of 2 ha. She began growing many different vegetables, following agroecological practices, in particular diversifying crops, developing intercropping and agroforestry to limit inputs, and using manure and compost to improve soil quality. She then developed her own commercialisation channels, which is rare in Reunion Island, since relations between farmers and consumers are not common. She has developed a CSA (Community Supported Agriculture) scheme with 27 local consumers, for which she organizes activities such as cooking lessons. The prices are lower than on the farmers' market, which caters mostly to tourists in Reunion Island. In the future, Sandrine would like to have more opportunities of discussions around agroecological practices with advisers and researchers.



Agroecological farming in Guadeloupe (FR) – Christophe Latchman (member of the FG)

Settled on his farm 2005, Christophe Latchman (expert member of the FG) had difficulties to build the system, get technical advice and make people understand the value of sustainable farming and agroecology. He is now producing vegetables and banana and has 1 ha of orchard with mangos, avocados, and other tropical crops (60 varieties of crops). He developed a CSA as well, providing fruit and vegetable baskets to local consumers. He organizes his marketing with 9 other farmers and also sells some products in the local farmers' market. He stopped selling to the supermarket 7 years ago because he had to use plastic packaging. He is now thinking to diversify his farm more, starting with touristic activities. Christophe and his wife are planning to build 5 lodges to receive tourists or researchers visiting the INRAE center next to the farm. Hosting tourists could be the occasion to benefit from the 5 ha forest he is taking care of, by producing essential oils and organizing visits to show local plants. He also underlined that he lacks relevant technical advice on his system.




Short value chains

Short value chains constitute an important option for locally produced food. They include the production, marketing and sales of products at the local/regional scale, usually with the involvement of actors situated in a range of a few kilometers and grown according to traditional practices. This particular characteristic makes them highly relevant to small islands and remote territories. Concerning horizontal and vertical integration, they entail the development of personal relationships and of numerous interactions among actors, including consumers. Among their numerous advantages is that they provide 'identities' to food products, by clearly connecting them with territories. Short value chains provide the means to overcome barriers relating to insufficient logistics, high production costs and lack of infrastructure for food produced in island and outermost EU regions. The evolution and support of well-performing short value chains can have significant positive effects to food production in the outermost regions of the EU, mainly because they can mitigate the negative effects of trading practices of large multinational retailers and wholesalers to smallholders, but also because they contribute to a fair redistribution of value among local actors.

Food Supply Chain

- Food Supply Chain or Food System refers to the processes that describe how food from a farm ends up on our tables.



Follow your food from farm to fork.

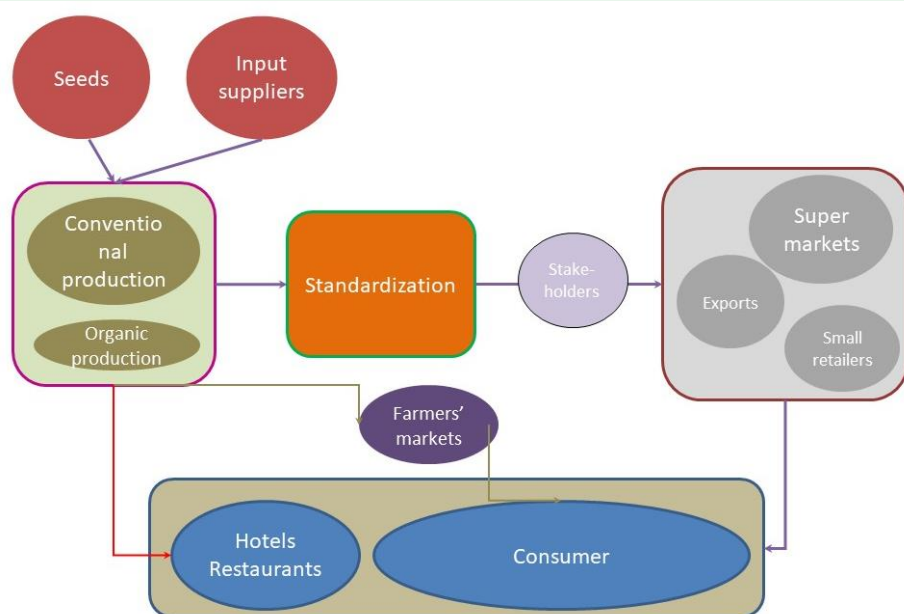
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Supply chain options for avocado in the Mediterranean island of Crete

Changes in the competitive position of traditional Mediterranean products (such as olives and citrus fruit) have led to the expansion of avocado, papaya, mango and other fruits in Mediterranean islands and coastal areas. In the Greek island of Crete, avocado production has seen an impressive growth in the last decade, mainly driven by increased global demand (and prices) combined with a decline in the competitiveness of oranges. It is estimated that avocado orchards are about 1500ha mainly in the Regional Unit of Chania, in the Western part of the island. A significant part of these trees has been planted during the last five years (mainly Hass varieties) and have not yet started full production. A fully productive tree can produce up to 200kg of fruit per year, but due to the fact that practices are sometimes inadequate, chemical fertilizers are (preferably) not used and there are no varieties specifically adapted to local environment, a part of planted trees does not reach full production. Under these conditions, total production per year is estimated to around 15-20 thousand tons per year, with increasing trends every year.

Market outlets for Cretan avocado are multiple, leading to the formulation of a variety of value chains. These options are depicted in Figure 2, which describes how conventional and organic products reach final consumption either directly from farms, either through middlemen in farmers' markets or through larger value chains, after standardization. However, this rapid expansion has given little time to allow an organized development of the processing and retail sectors. Short value chains (mainly through local markets directly to consumers or direct sales to businesses – hotels and restaurants) are preferred by farmers for their easiness. Actually, the system is in need of a sustainable strategy for development, which will be based predominantly on effective communication among actors, market transparency and product identification and certification to penetrate international markets.

Figure: The developing value chain of avocado production on the island of Crete (Greece)



2.2. State-of-the-art in processing needs

Processing units on the farm are very little developed today in most EU OR due to a lack of knowledge of the fruit and vegetable processing processes. In addition, most food processing techniques proposed for ORs use technologies that are not adapted to local agriculture. Most local farms have lost the traditional knowledge, tools and know-how for processing their agricultural products. Actually farmers struggle to cope with new technologies and production practices, however, this knowledge and tools and on-farm processing workshops were common up to several decades ago, when trading with the outside world was still limited, especially in the Overseas islands. These processing workshops are currently lacking in ORs, while conserving fruits in particular would be useful in view of the seasonality of production.

Simple transformation processes can be carried out directly on the farm and does not require a large financial investment. The creation of small collective or individual processing workshops on the farm makes it possible to enhance the production process, by ensuring manufactured product sales in a longer period and not only during the peak of production. In addition, this practice generates short local value chains and provides opportunities for income to other local actors as well. Some relevant examples of small-scale innovative transformation tools exist such as production of flour (cassava, yam, banana, sweet potato,...), jam workshop, production of dried fruit, lacto-fermentation of the vegetables and also fresh fruit juices. There is a need to (re)develop and up-scale such suitable, customisable workshops on farms. Farmers or farmers` collectives may experiment, design, and build workshops and adaptations themselves.

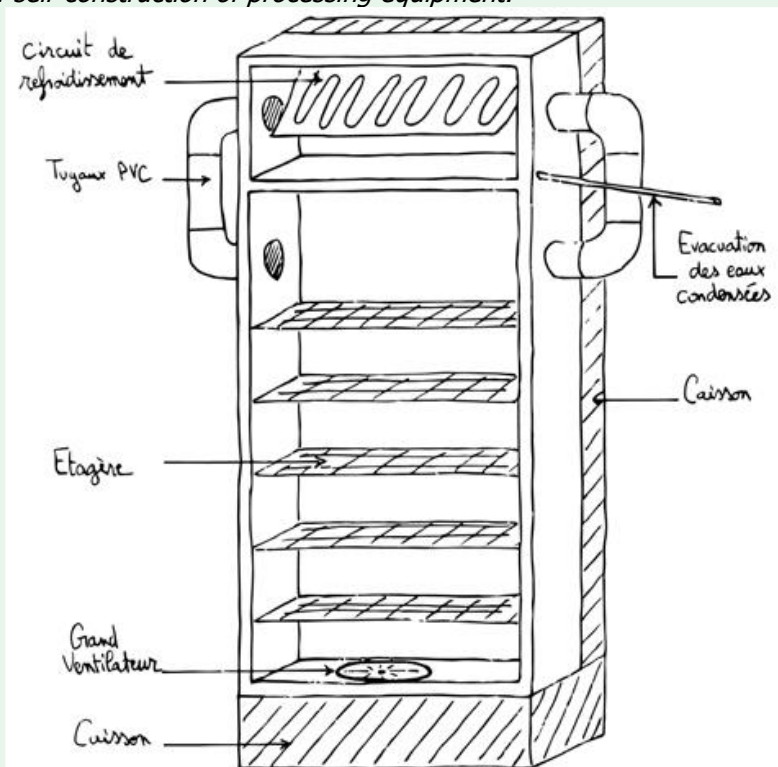
Examples have been developed in mainland EU even from previous decades, for instance in the form of Women Cooperatives and farm-scale processing units. For OR, however, the know-how of peasant transformation, recipes to simplify can be considered as appropriate technologies. There is a need for suitable, customizable work tools.

Table 1. Example of need for processing equipments

Processing equipment	Function	cost	Self build	Production
Shredder, press, rape		way	yes	flour, jam, juice
Autoclave	Sterilizer	Dear	no	jam, juice
Cooking basin	Cooking	way	no	jams
Pasteurizer	Sterilisateur	Dear	yes	juice
cooking tank	Cooking	Dear	no	jam, terrine
Freezer	Conservation	way	no	juice, pulp
Freezer	Conservation	Dear	no	fresh frozen
solar dryer	drying	way	yes	dried fruit

Creating small collective or individual **processing workshops** at farm level would allow expanding the food supply chain in the local areas. There are many possibilities of self-construction for processing equipment on the farm. The "Atelier Paysan" association shares [open source notices](#) to develop on-farm material, such as a solar oven and autoclave that were self-built by farmers. Figure 1 presents an example of the transformation of an old fridge to dry fruit processing equipment (Atelier paysan).

Figure 1. Example of self-construction of processing equipment.



2.3. Synergies with other value/supply chains

Development of novel value chains for tropical species growing in temperate continental Europe – the case of bamboo in south Europe

Despite its tropical distribution, the bamboo botanical family encompasses species that can survive in a wide range of climates. Some species can be successfully grown in hotter climates in the South of continental Europe such as Portugal and Spain, and ecological conditions are becoming increasingly adequate to vigorous growing in these regions, due to climate changes. Bamboo is receiving a huge interest recently in recognition of its potential for sustainable goals, namely fast growing and significant carbon sequestration potential, capability to immobilize pollutants and regenerate soils, also preventing soil erosion, and growing with limited or no pesticides or chemical fertilisers. Bamboo is a multifunctional species and, therefore, can develop numerous novel value chains in Europe, in diverse sectors as food, construction, insulation, furniture, handicraft, fuel, clothes, environmental technology and, very importantly, is well suited to replace wood in paper and plastics in an endless list of utensils and tableware.

Portugal holds the largest bamboo nursery in Europe in São Teotónio (Bambuparque in the south of the country). A number of companies and organizations are establishing commercial plantations in South Portugal and Spain, such as BambooLogic or Bambusa. Small-scale private companies are also growing (e.g. bambu bicycles) asking for a functional value chain, both to get access to bamboo material and to offer their products in the market.

Novel bamboo value chains stand as an opportunity since

- Europe is the biggest export market for Asian bamboo products
- Growing conditions, degraded land and bamboo shoots are available
- Knowledge and innovative processing industry is present
- Avoiding heavy overseas CO₂ transports
- Pricing not dependent on currency fluctuations and tax issues
- Bamboo is a powerful tool to attain European climate action goals and other SDG's and to help restore degraded and abandoned agricultural land
 - It is a new segment that can help reviving the European agricultural sector and be a catalyser for new (high tech) industries

Tourism and agro-tourism

Most of the islands and countries in the Caribbean and in the Mediterranean are very dependent and focused on tourism. Although the modern tourist expects a local experience when visiting these destinations, the local farmers are seldom involved in the development of touristic products of each destination. Nonetheless, tourists seek for local products and buy them in local – often informal – markets, with lower added value captured by the producers. International experience has shown the value of including the local farms as a local experience for the tourism market (Aruba's farm-to-table experience). It not only generates an extra income for the farmer that gives a tour but also creates a new market for his fresh and/or processed produce. Another experience can be the "living on a farm" experience where the farmer rents out a facility to the tourist and let them participate in his daily activities. This creates more awareness on the value of local production and creates new markets.

2.4. Cross-cutting issues affecting the performance of value chains

2.4.1. Trading practices

Farmers in islands and outermost regions of the EU – much like all smallholders in the EU - do not always achieve the prices that their products merit, mainly because they lack the bargaining power of bigger entities which would allow them to negotiate in fairer terms. This way, they still remain "...the most vulnerable link in the food supply chain" (European Council, 2016) . Consumers call for increased market transparency, which will ultimately remunerate farmers for the quality of their products and will ensure that consumers have access to good quality food at rational prices. This issue is highly relevant to the socioeconomic context of outermost regions of the EU, for which the distance from large production centers, inelastic and uncertain local production and dependence on imports for specific staple products constitute factors making them vulnerable to changes in the international trade context. Opportunities arise through the inclusion of social and environmental criteria in public procurement contracts (e.g. for public organization catering).

The first **Market Information Systems (MIS)** were born in the United States in the 1920s, with the aim of thwarting monopolies: tools to support the liberalization of agricultural sectors. These are public devices whose function is to collect and disseminate information on prices, varieties, product quality, level of use of market places, quantities traded and stocks. However, in French Guiana, the market is not as transparent as it should have been to help farmers ameliorate their position. Other than a weekly price published by the Guiana chamber of agriculture, no other information is available on the raw materials market in terms of production or availability of stocks. The actors of the sectors are unknown. It seems that commodity prices fluctuate suddenly without any evident economic explanation and this could be due to the fact that the agricultural commodities market is facing an oligopoly situation. This situation also prevents the processing units from planning their productions and respecting the regularity of deliveries.

2.4.2. The role of collective actions

Small scale farmers are confronted with many problems to run a viable farm. Because of their small scale it is difficult to obtain inputs needed for the production of agricultural produce (either due to high prices but also to low availability in remote and/or outermost regions) but also the processing and marketing of their produce will cost time and effort that cannot be invested in a well-managed farm. Their limited production will make them more susceptible to middleman that buy their produce cheap and sell with excessive margins to the supermarkets. To gain the benefit of scale, small-scale farmers should organize themselves in collective actions (such as Cooperatives and Producer Groups/Organizations). These collective actions don't have a maximizing of profit strategy but can organize the bulk buying of needed inputs and sell them to the members for cost plus administration cost. Furthermore, Cooperatives can organize weekly markets or function as a go between supermarkets and farmers. For example, in the emerging value chain of avocado in Crete, a significant (and increasing) part of production (estimated around 30% of total production) is channelled to national and international markets through three collective actions (two Cooperatives and one Producer Group), which undertake most marketing activities.

Cooperatives can also be used to transfer knowledge between the different farmers etc, supporting or revitalizing agricultural advisory services. For small-scale farmers it is costly to store their produce until a buyer is found. Collective actions can offer storage as a service or can promote and facilitate the processing of produce to extend their lifetime or increase their sales value.

Despite their unquestionable advantages, local farmers' organizations and formation of local collective actions is not an easy task. Someone needs to take the initiative, call and organize the other farmers into a cooperative. It is not an easy task since this person has to offer a lot of his/her time on a volunteer basis and face issues such as distrust, scepticism and bureaucracy. For this, it is advisable that this person, at least initially, be a researcher or a local authority representative (including local advisory services and relevant structures) who have the means and/or the experience to create such collaborations and support farmers also on technical issues.

2.5. Options for sustainable supply chains

2.5.1. Regulating production – Availability of raw material

The availability of raw material for consumption and/or manufacturing in island and/or outermost EU regions constitutes an important issue affecting the operation of agri-food markets and the efficiency of relevant supply chains. Adverse local climate conditions, unavailability of labor and of useful inputs combined with poor logistics, low yields and production volumes reduce opportunities for cost-efficient production and transformation.

Barriers to efficient production – The case of French Guiana

It is accepted that the transformation of agricultural products is one of the main levels to enhance the production of the farm and reduce post-harvest losses, especially in tropical regions where the conservation of food is extremely difficult. This is one of the reasons why the processing of foodstuffs is a constant concern for agricultural product processor in French Guiana.

In French Guiana, the processing of foodstuffs is mainly carried out by very small units which face many problems impacting the cost price of their productions. The production of the raw material is carried out seasonally by small family farms. Agricultural production inputs are imported from the mainland France 8000 km away. Labor is very scarce and expensive compared to the cost of labor in the region. Farmers are dispersed and have to bear transport costs (when roads and means of transport exist). Farmers are not grouped into a cooperative which makes it even more difficult to invest in storage infrastructure. Thus, the supply of artisanal processing units is hampered by in addition to the aforementioned constraints, but also by difficulties for the packaging of finished products, which would allow them to honor a good regularity of their production. Compliance with the required quality standards and consumer satisfaction.

2.5.2. Labelling and certification

Labelling can contribute twofold: increase the value of agricultural products as well as their demand. At a time that the present pandemic combined with the economic crisis has majorly affected consumers' purchasing power, they must be convinced that it is worth spending some extra money to buy a product from a local market rather than a similar one, imported or conventionally produced, from a super market. So consumers must be convinced to monetarily contribute to the higher production cost of a specific item and labelling can help justify this, as a tool to provide them with all relevant information that they require in order to make an informed decision. Labelling is a one-way option if we seek to support local farmers and, hence, contribute to regional development, in particular to areas away from big cities and markets. Tourism will value labelled products, contributing to added-value and boosting local value chains.

Certification schemes are increasingly gaining attention and importance in agri-food chains. Certification and labelling reflect societal pursuit for agri-food products produced and manufactured following specific standards and specifications covering for the demand of the public for issues such as animal welfare, environmental protection, fair income for rural population etc. These schemes are recognized by aware consumers and may serve as a means of communication of societal preferences to farmers and – in return – of environmental friendly farming practices to consumers. An important aspect of such certification schemes involves the use of inputs which can be detrimental for the environment. An example of such certification is organic production, which has been applied globally, as well as a variety of schemes and opportunities explained in the remainder of this Section. However, other voluntary certification schemes are already available, while the "eco-schemes" proposed in the context of the new Common Agricultural Policy reform (2021-2027) could provide a future option for new certification opportunities.

Table 2. Selected examples of existing labelling requirements and certification schemes in the EU

Type	Details
<i>Country of origin</i>	Required by EU laws for every food or silviculture product in the whole EU
<i>Agriculture Quality Policy "Quality Package 2010"</i>	certification schemes, value-adding terms for agricultural product qualities, and product standards, covering the different facets of quality
<i>Geographical origin of the products</i> ✓ <i>Protected Geographical Indication (PGI)</i> , ¹ ✓ <i>Protected Designation of Origin (PDO)</i> ✓ <i>Traditional Speciality Guarantee (TSG)</i> ²	E.g. <i>Denominación de Origen</i>
<i>Food quality certification schemes</i>	
<i>Certification associated to Food safety requirements</i>	
<i>EU best practice guidelines for voluntary certification schemes</i> ³	AENOR in Spain
<i>Fair Trade</i>	Already well set for Bananas; Cocoa; Sugar Cane/ Sugar
<i>EU FV Marketing Standard</i>	Apples, citrus fruit, kiwifruit, lettuces, curled leaved and broad-leaved, peaches and nectarines, pears, strawberries, sweet peppers, table grapes, tomatoes
<i>EU General Marketing Standard (GMS)</i>	Fruit and vegetables not covered by a specific marketing standard shall conform to the general marketing standard
<i>Organic and biodynamic production</i>	Well set for most products and outermost regions

¹ http://ec.europa.eu/agriculture/quality/policy/quality-package-2010/labelling-guidelines_en.pdf

² http://ec.europa.eu/agriculture/quality/schemes/index_en.htm Database of Origin and Registration, <https://ec.europa.eu/info/food-farming-fisheries/food-safety-and-quality/certification/quality-labels/geographical-indications-register/>

³ http://ec.europa.eu/agriculture/quality/policy/quality-package-2010/certification-guidelines_en.pdf
<https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX%3A52010XC1216%2802%29>

Examples of geographic labelling/certification for the Canary Islands.

IGP: Bananas from the Canary islands <https://platanodecanarias.es/>. Works extremely well at the regional, national and international levels.

DO from Canary islands

Wine:: D.O. Abona; D.O. El Hierro; D.O. Gran Canaria; D.O.P. Islas Canarias; D.O. La Gomera; D.O. La Palma; D.O. Lanzarote; D.O. Tacoronte-Acentejo; D.O. Valle de Güímar; D.O. Valle de la Orotava; D.O. Ycoden-Daute-Isora

Protected Designation of Origin (PDO)

PDO-ES-0866 Papas Antiguas de Canarias
PDO-ES-0943 Miel de Tenerife
PGI-ES-0867 Plátano de Canarias
PGI-ES-0942 Gofio Canario
PDO-ES-01302 Cochinilla de Canarias

Existing labels are already found in ORs and could be adapted or combined

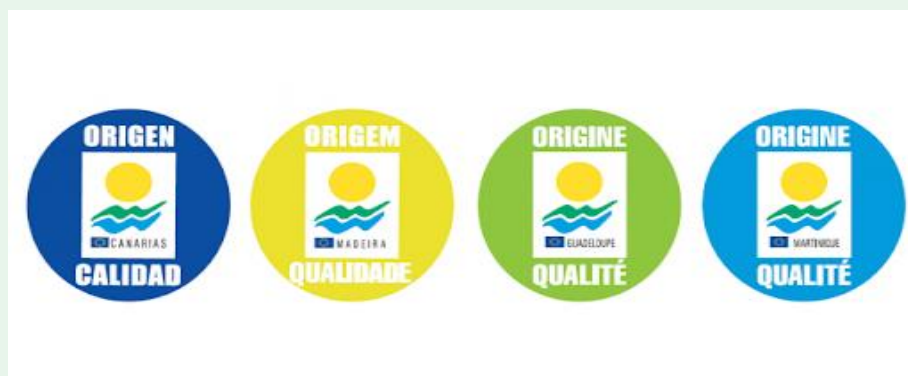
Especially certifications on farm-level practices, such as organic or biodynamic production are well-known and recognise the environmental quality of production. Certifications of origin or locality, such as "Dos" for ORs or DPO are used. Finally, Fair trade labels are already well set for Bananas; Cocoa; Sugar Cane/ Sugar. Information and Communication Technologies would assist acceptance of new foods by consumers and farmers, especially traditional food produced locally but not always appreciated by local consumers. Communication on value chains could advocate health and environmental benefits (including shorter supply chains) to also avoid negative public perceptions in continental Europe (e.g. water consumption in avocado growing in Southern Europe). Examples may be found in mini-paper 3.

Is certification a tool for outermost regions?

The sharing of knowledge between different outermost regions on the subject of processing on the farm, allows to see the need to share a collective brand or logo that will enhance its productions at the local level but also for export throughout the European territory.

At the European level, there is a logo (*RUP*) to differentiate the productions of the outermost regions of Europe (and is also differentiated across territories as in the Figure), but it can be used by the various actors (not only farming). However, this symbol has many advantages that should be taken into account. It has a double requirement of origin and quality:

- A requirement of local origin for processed products, which must be 100% local
- Quality criteria set in locally defined specifications. European regulations impose basic quality criteria which reassure consumers about the sanitary quality of production.



2.5.4. Smart promotion options

The next step, and similarly important, is advertisement and communication to consumers. This can be done in many ways, some of which are almost free of charge (e.g. internet). A website can be created that will present the local products and provide all the information that consumers need to know to choose from. It must be user friendly so that consumers will be able to choose and buy them easily from the pace of their houses and be delivered safe and fresh as soon as possible. This is easy for young farmers familiar with the use of modern technology but not so for farmers less acquainted to computers.

The organic banana plantation of Bourbon was born seven years ago in the West of the island, at Colimaçons. On two hectares, Katuscia Payet, farmer and manager of the Bananeraie Bio de Bourbon Réunion Island, grows organic bananas that she transforms to obtain flour, dried bananas and jam to which the business manager has given her personal touch. It indeed produces banana / chocolate jam, candied banana / tangor, wild pepper banana. In fairground markets, she also offers fresh bananas for sale. At the same time, the farmer works the flower of the banana tree, the fig baba, which she transforms into pickles, decorating it with seasonal vegetables. La Bananeraie Bio de Bourbon thus offers plain fig baba pickles, but also fig baba / green mango pickles, fig baba / chouchou, or fig baba / pineapple. After the passage of several cyclones, we decided to enhance our production of organic bananas by innovating and transforming them into products unknown to the general public.



3. Conclusions

This mini-paper has demonstrated a broad range of challenges which value chains of farm products in OR or (sub)tropical products face. Options relating to multifunctionality, integration to other value chains and supply chain organization (logistics and efficient transportation options) are important to ensure the viability of farmers in the mid-run. However, there are also important issues to consider in terms of product quality and processing, also relating to the environmental footprint of products and the maintenance of traditional practices.

Some actions are to be recommended according to contexts and situation for OR and/or (sub)tropical products in MR include:

- Bring farmers together in cooperatives
- Increase the availability of farmland
- Establish a relationship for the delivery of quality products on a regular basis
- Set up conservation structure such as collective cold rooms and Living Laboratories (more ideas in Section 5)
 - Make the monitoring of local raw material price markets more accessible to properly manage the good supply of processing units and increase transparency. In this sense, also look for tailor-made and effective options to improve the performance of markets and supply chains by building viable relationships among actors
 - Reduce/simplify the administrative procedures for access to CAP income support and investment schemes – allowing flexibility on the specificities of remote, island and outermost regions.
 - Revisit national laws to include environmental and social positive externalities in support of public procurement using local sustainable supply chains.
 - Valorize the experience of locals – including traditional ecological knowledge.

Table 2. Challenges identified on value chains

Topic of interest	Challenge to cope with	Examples	Lack of information
Value chains to label multifunctional (sub)tropical crop systems	<ul style="list-style-type: none"> • Marketing channels - promote the multifunctional role and ecosystem services of the local agrosystems or food production systems in outmost regions • Certification and traceability • Consumers` and population increasing food demand 	<ul style="list-style-type: none"> • the need to promote the sustainability of food supply chains namely through lowering the carbon footprint • Promote greening and sustainable practices in local agrosystems 	<ul style="list-style-type: none"> • Strong demand for tropical products originating from ORs (niche markets) • lack of data on imbalance of food production/ consumption and its negative impacts on the ecological footprint • Need to add information on sustainability (carbon, water footprint for example, use of agrochemicals etc) of the whole value chain as a certification of "high-value" products
Local processing facilities	<ul style="list-style-type: none"> • Set up/develop the industry • Sectors are unstructured and are concentrated in private homes. • Consumer and population increasing demand • Use of collective facilities, business model 	<ul style="list-style-type: none"> • Producer organisations (example in Reunion Island / Guadeloupe) • Markets for dried fruits 	<ul style="list-style-type: none"> • Lack of quantified information on the sector: levels of production, location to evaluate the need for processing options • Successful relevant options and scalability

4. Research needs

The main research identified for value chains of agricultural products in OR and/or for (sub)tropical species are presented in Table 3. Also, some additional issues are specified below

Table 3: List of themes for research needs from practice

Topic of interest (MP)	Knowledge gaps identified	Ideas for research needs from practice
Developing value-chains including processing facilities for tropical crops, especially in ORs (MP4)	<ul style="list-style-type: none"> • How to relate ORs traditional systems to sustainability/services provided to develop labels 	<ul style="list-style-type: none"> • Development of local resilient food systems and value chains to decrease the ecological footprint and foster a circular economy. • Encourage two `layers` - practices and products - find out more about both the practices and the products, and their values <ul style="list-style-type: none"> ➔ Consider intangible cultural heritage – UNESCO, example of biosphere reserve products in Madeira, ➔ Links with Green Deal farm to fork strategy > biodiversity - linked label - including soil biodiversity ➔ Compare nutritional value/food safety of imported vs local products • Evaluate the impacts of the services provided by farmers/farms and reflect them in food production prices. <ul style="list-style-type: none"> ➔ Develop value chains to recognise local resilient food systems ➔ Value low ecological footprint, low transport and circular economy, e.g. labels for tropical fruits produced in Europe (less chemicals, grown following EU standards).

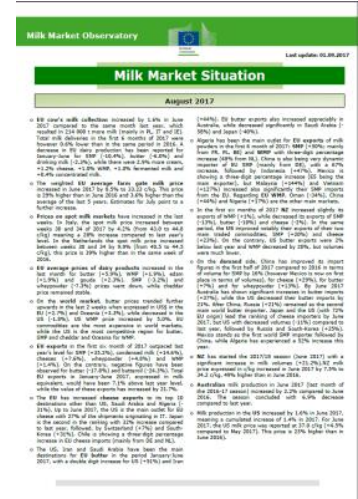
4a. Little knowledge of the nutritional quality of tropical fruits and vegetables and of storage.

This is highly related to increasing the market potential of such products. Research of this issue could also demonstrate how local products can be used as substitutes for imported ones. Quality criteria set in locally defined specifications could be important, as European regulations impose basic quality criteria. These criteria reassure consumers about the sanitary quality of production.

4b. No reference to the processing of fruit and vegetables on the farm. More research is needed to adopt guidelines to ensure the development of the sector by emphasizing cooperation, the emergence of agricultural SMEs (small and medium enterprise) and their organization into local production systems. The uptake of systematic on-farm processing will be built through experimentation, designs and adaptations directly by the farmer.

4c. Set up Market Information Systems would be needed – such as the Price Observatories already available by the EU for key products such as milk. In order to facilitate this, Information and Communication Technologies (ICT) as well as digital technologies are required to promote product marketing and the communication between sellers and consumers. In particular, simple, widespread and easy-to-use tools and platform can become useful tools for actors in supply chains – like in the examples of the island of Bonaire, where a lot of farmers use Facebook to sell their produce directly to consumers and of WhatsApp in French Guyana.

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4d. Marketing innovative research/prospective projects for the current geographical certifications

5. Ideas for Innovations

Table 4 consolidates a set of proposals – based on the experience of members of the FG – regarding possible innovations at the value chain level. In addition, some points to clarify the content of Table 4 are presented below.

Table 4: Ideas for operational groups and other innovative projects

Topic of interest (MP)	Knowledge gaps identified	Ideas for operational groups or other innovative projects
Developing value-chains including processing facilities for tropical crops, especially in ORs (MP4)	<ul style="list-style-type: none"> • Knowledge on existing labels that could be adapted to OR products • Adapt processing facilities to farm and local level small industries • Reducing the distance between farmers and consumers and valorise the byproducts 	<ul style="list-style-type: none"> • Explore the relevance of adapting existing labels to certify the quality of the products from climate-smart tropical cropping systems → Study policy measures or protect products through market-related measures - connecting producers and consumers / test which approaches would benefit producers <ul style="list-style-type: none"> → Test ways to create value for producers - showing carbon sequestered, biodiversity enhanced, ... • Develop customised solutions to construct low cost and small-scale food processing equipment. <ul style="list-style-type: none"> → Study the feasibility of creating processing facilities for a collective of farmers or small cooperatives (size, type, investments, organisation, ...) • Develop circular economy channels to use more local products <ul style="list-style-type: none"> → use all the byproducts, including biomass etc. - to reduce imports - eg Madeira - small enterprise producing germination boxes using banana bracts

- Support and installation of central purchasing offices for raw materials, packaging, small equipment and spare parts. This collective approach would also be very beneficial towards circular economy patterns.

- **Co-creation of innovative solutions.** A solution to facilitate this approach is the formulation of Living Laboratories (LL), with the integration and motivation of involved stakeholders to discuss and co-create solutions, which will be tested collectively. Some ideas and opportunity for the role of Living Laboratories in remote and/or outermost areas include

- Tourism and agro-tourism sectors. It is very important to create awareness about possibilities for including farm-related activities in the touristic product of an area. Tourism development agencies, Boards and other relevant Organizations (Depending on the area) should involve farmers (but also other actors in agricultural products value chains) more actively.
- Develop facilitation mechanisms to include short supply chains in local procurement contracts.
- Find new ways to mobilize local actors but also make them feel like they are actively involved in the process of development

- The candidate partnership under Horizon Europe "Accelerating farming systems transition: agroecology living labs and research infrastructures" could strengthen the role and outcomes of these LL

Apart from LL, the creation of small collective or individual processing workshops on the farm would make it possible to enhance production and expand food supply in outermost Regions (e.g. workshops on drying fruit, producing jams and other non-perishable products). The know-how of peasant processing, recipes to simplify can be considered as appropriate technologies.

- Develop certification schemes and options, including the following considerations
 - Carbon/Water footprint certifications for key products for the EU (such as avocados, bananas, mangos)
 - A European collective brand could be considered as an option by a production approach transformed directly on the farm and produced in compliance with the environmental and social criteria specific to our territory

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