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AGRICULTURE & INNOVATION



EIP-AGRI Focus Group

Plant-based medicinal and cosmetic products

MINI PAPER 3. Benefits of Medicinal and Aromatic Plants for farming/forest systems: multifunctionality, ecosystem services and social benefits

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1. Introduction/motivation

For the purpose of the Focus Group a “Plant-based medicinal and cosmetic product” *is defined as a plant raw and semi-processed material (e.g. dried herb, essential oil, extract) that can be obtained by a medicinal and aromatic plants (MAP) producer (i.e., grower or wild collector) and used for manufacturing various plant-based products such as herbal medicines, cosmetics, supplements & functional food.*

The new paradigm of rural development considers multifunctionality as a key issue. The definition adopted by OECD, characterizes multifunctionality by: i) the existence of multiple commodity and non-commodity outputs that are jointly produced by agriculture; and ii) the fact that some of the non-commodity outputs exhibit the characteristics of externalities or public goods, with the result that markets for these goods do not exist or function poorly (OECD, 2001).

MAPs hold great potential to contribute to multifunctionality in agriculture by increasing diversification and innovation options in rural areas, creating opportunities to value local resources and creating new dynamics, employment and income opportunities even in depopulated rural regions. However, this innovative character also implies immaturity of the value chain, being the pioneers many times the pathfinders trying to achieve knowledge by trial and error processes. In this sense it's crucial to link academy and stakeholders to discuss opportunities and constraints using MAPs as a multifunctionality tool and to be able to value and monitor the ecosystem services and social benefits of the MAPs at the same time.

2. Dissertation

2.1. MAPs: Management practices focusing on creating multifunctionality Postharvest handling

Many MAPs are well adapted to partial shading, allowing them to be intercropped with timber and fuel wood plantations, fruit trees and plantation crops (Rao, Palada, & Becker, 2004). Some examples of this use:

- a) Agroforestry systems (for example as alley-cropping) and Forest Farming:
 - Planting MAPs between traditional orchards (e.g. Thyme is cultivated in Olive orchards in Murcia, Spain);
 - Lavender is cultivated in truffle-mycorrhized oaks orchards in Provence, France and in Spain.



Picture 1: Campos aromáticas con olivos al fondo en el Balneario El Raposo ©Pambiótica. Source: <http://jUSDolive.fr/loliveraie-de-miel/>.

- Create new agroforestry combinations (e.g. in an essay in Catalonia, managed by the Forest Science and Technology Centre of Catalonia (CTFC) hybrid walnut tree (*Juglans x hybrida*) was cultivated jointly with MAPs: first 6 years with *Salvia officinalis* and next years with *Melissa officinalis*, which will benefit from less evapotranspiration).
- Ginger farming in natural forests in USA;



Picture 2: Ginger farming in natural forests in USA; Source : <https://www.flickr.com/photos/forestfarming/14599858867>

These alley cropping combinations can be maintained in the long term or be limited to the first years of a tree plantation, when there is a significant amount of sunlight reaching the soil.

b) MAPs oriented / MAPs aware forest management: the wild MAPs may represent an extra income in forest management, particularly with silvicultural practices that can promote both tree and MAPs development as selective bush clearing, tree thinning to modify the light available at ground level, etc.

One example of this management is Herdade de Vale Côvo, in Mértola, Portugal (<https://www.herdade-valecovo.com/>). In this farm, the native holm oak forest, houses medicinal and aromatic herbs and shrubs, like the rockrose, wild native lavenders and rosemary. The farm also includes other forest plantations, like eucalyptus and pine and an additional area of planted rosemary. The most important issue is that, most of the work farm consists on vegetation management, made to improve the yield and quality of the essential oils, that are the primary product of the farm.



Picture 3. Herdade de Vale Côvo. Source : <https://www.herdade-valecovo.com>

In addition to the essential oils, the farm also offers artisanal cosmetics, rural tourism activities and honey.

c) MAPs and Beekeeping: leaving a percentage of wild MAPs for the bees or even promoting their dissemination. Or promote the establishment of MAPs in non-productive areas (e.g. steep slopes) for bees.

d) Riparian buffer zones with MAPs, improving water quality, protecting from erosion and providing habitat for wildlife (Rao, Palada, & Becker, 2004), especially when combined in agroforestry systems with various root layers.

e) MAPs and tourism/leisure/wellbeing/landscape: Special consideration of landscape approach to increase the sense of pleasure, diminishing stress, inspiration, creativity and raising awareness/education:

- Ethnobotanical hikes for wild species (e.g. <http://naturalwalks.com/en/>)

- MAPs cultivation in small surfaces, receiving visits for doing practical training addressed to urban people (eg. "Parc de les Olors" Aroma's Park <http://pardelesolors.com>). Theoretic and Practical training/internship: a small, but diversified herb farm can offer a compact professional training (soil and fertilization, making compost, sowing, propagation, maintenance, pruning and harvesting techniques, drying or distilling, etc. In addition, its small-scale diversity gives students the opportunity to learn a lot in a short period of time, or at least to be aware of the multifaceted knowledge that is needed for growing quality.



Picture 4: Activities in Parc de les Olors del Serrat, Catalonia, Spain. Source : <http://parcdelesolors.com>

- Food and/or Wellbeing Tours with herbs: tourism based on visiting herbs farms, workshops (collecting, distillation, producing cosmetics, etc.) and cooking and tasting meals with herbs (e.g. <https://visitmertola.pt/blog/item/caminhadas-criativas-01-com-aromas/>).
- Enhanced eco-tourism experiences linked to high aesthetic value landscapes, at farm level (e.g. eco-tourism facilities), municipal (e.g. Brihuega village in Spain) and even regional (e.g. Provence in France) level.

2.2 How to better conciliate MAPs and different uses (other crops, forestry, beekeeping) with?

Despite the great potential of MAPs to increase farm multifunctionality, some challenges must be overcome:

- In a farm managing other traditional crops, medicinal plant cultivation should be scheduled to avoid overlaying of crop works (e.g. Harvesting time).
- In a forest managed with timber production as a prevalent activity, exploitation of medicinal plants should be incorporated into the management plan to search for synergies, or at least compatible harvesting (e.g.: create suitable conditions for both timber and MAP production or at least make compatible over time harvesting and logging operations).
- If MAPs are cultivated for doing beekeeping, it is necessary to:
 - i. Prioritize what is more important: beekeeping or MAPs production, as many plants should be collected before or during flowering.
 - ii. Plant different species to ensure flowers availability throughout the year (e.g. Rosemary flowers in winter, Thyme flowers in spring, Lavender in Summer, Savory in Autumn).
 - iii. Combines the various activities of some species (e.g. Sage could be left for beekeeping in Spring and harvested as botanical herb in Autumn).

2.3 MAPs and Ecosystem Services

Ecosystem services can be defined as the benefits obtained from ecosystem that are crucial for human survival and quality of life (Anton et al., 2010). They can be classified as provisioning services (food, fresh water, fuel), regulating services (e.g. water purification, climate regulation), supporting services (soil formation, habitat, nutrient cycling) and cultural services such as spiritual use, recreation or educational services (Millennium Ecosystem Assessment, 2003). However, ecosystems can only continue to provide these services in a rapidly changing world if such multifunctionality is taken into account in their management (Harrison et al., 2010)

MAPs can promote various ecosystem services:

- Increasing biodiversity and habitat quality (insects, birds etc.), making the whole system more resilient,
- Attracting auxiliary insects (controlling pests and diseases),
- Increasing CO₂ sequestration and efficiency in the use of resources (light, water, soil nutrients),
- Preventing soil erosion with perennials MAPs,
- Contributing to increase/maintain important genetic resources for medicinal uses (About 12.5% of the 422 000 plant species documented worldwide are reported to have medicinal values) (Rao, Palada, & Becker, 2004),
- Aesthetical land valorization.

The value of the ecosystem services provided by MAPs, is not linear: different social and ecological contexts, and different farming techniques can condition the services provided by MAPs cultivation in a multifunctional system. It would be interesting to develop a reference list of ecosystem services (which can be monitored in a simple and transparent way) for distinct managing systems, in line with an adequate rating scale and develop the suitable formulas to account their value.

A proposal would be that the farmer/landowner, received yearly a previously fixed amount for each measurement/ecosystem service, he/she has implemented. A small technical team, that also gives advice and permanent support would do the monitoring in a stimulating and supportive way.

2.4 MAPs: Economic aspects and Social functions

The growing demand for MAPs and the need to increase diversification of agricultural practices make MAPs a good alternative crop, especially if used in a multifunctional system. Even if they are still a non-commodity, MAPs can increase farmers' income, and provide other social inputs:

Direct economic impact: New herbs farms helped young unemployed to start a new business in rural Portugal during financial crisis; in other countries, MAPs represent an important additional or alternative income for farmers.

Indirect economic impact: MAPs can stimulate other economic sectors (tourism, restaurants, wellbeing and Spa, transformation industry – food, pharmacy, cosmetic, perfume, etc. distilleries, retail), or even play an important role mitigating depopulation of the countryside (Valente, 2009).

In degraded regions, affected by desertification processes, MAPs may easily find room in low-input productive systems, able to enhance the multifunctionality traits of agricultural sector (Carrubba, 2009).

It's also important to highlight that MAPs can easily be used in a circular economy concept, by the (re-)use of leftovers by making compost or/and extracting bioactive components.

Other social aspects related to education, cultural uses and others are:

MAPs create the need for cooperation structures (horizontal between stakeholders plus crossing with other sectors).

MAPs cultivation, processing and marketing require specific knowledge. This raises the need for education (theoretical and practical approaches), which could result in the foundation of professional schools/research labs, etc.

MAPs promote social cohesion, regional identity and self-esteem:

- MAPs are linked to the traditional kitchen/local menu and/or to home remedies.
- In general MAPs belong to the cultural heritage of a given society.

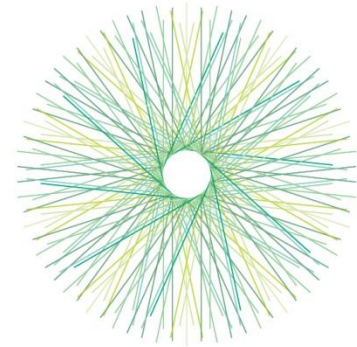
3.3. Innovative ideas and Potential EIP Operational Groups

In this focus group, some contributions have been launched that can inspire new research work and innovative ideas around aromatic and medicinal plants and possibly new EIP AGRICULTURE operational groups.

- Study of MAPs interactions in agroforestry ecosystems:
 - i. Design agroforestry systems including MAPs in different social, soil and climate conditions;
 - ii. Research on and/or experimentation of multifunctional forestry systems combining timber with other forest products (NTFP): MAPs, nuts, mushrooms, hunting, etc. – management issues.
- Examine and value ecosystems goods and services provided by MAPs in the context of long-term sustainability (methodologies), including human well-being; Define and test compensation mechanisms to MAPs farmers with high performance in ecosystem services.
- Research innovative circular economy solutions, such as creating value and new applications to close the system, create value with MAPs leftovers and ensure sustainable production cycles.
- Test the use of MAPs on local development, social and health projects by taken into account the multi-actor approach: (e.g. rosemary cultivation and use for Alzheimer or diabetes on nursing homes, etc. (Habtemariam, 2016), (Khalil et al. (2013))).

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The European Innovation Partnership 'Agricultural Productivity and Sustainability' (EIP-AGRI) is one of five EIPs launched by the European Commission in a bid to promote rapid modernisation by stepping up innovation efforts.

The **EIP-AGRI** aims to catalyse the innovation process in the **agricultural and forestry sectors** by bringing **research and practice closer together** – in research and innovation projects as well as *through* the EIP-AGRI network.

EIPs aim to streamline, simplify and better coordinate existing instruments and initiatives and complement them with actions where necessary. Two specific funding sources are particularly important for the EIP-AGRI:

- ✓ the EU Research and Innovation framework, Horizon 2020,
- ✓ the EU Rural Development Policy.

An EIP AGRI Focus Group* is one of several different building blocks of the EIP-AGRI network, which is funded under the EU Rural Development policy. Working on a narrowly defined issue, Focus Groups temporarily bring together around 20 experts (such as farmers, advisers, researchers, up- and downstream businesses and NGOs) to map and develop solutions within their field.

The concrete objectives of a Focus Group are:

- ✓ to take stock of the state of art of practice and research in its field, listing problems and opportunities;
- ✓ to identify needs from practice and propose directions for further research;
- ✓ to propose priorities for innovative actions by suggesting potential projects for Operational Groups working under Rural Development or other project formats to test solutions and opportunities, including ways to disseminate the practical knowledge gathered.

Results are normally published in a report within 12-18 months of the launch of a given Focus Group.

Experts are selected based on an open call for interest. Each expert is appointed based on his or her personal knowledge and experience in the particular field and therefore does not represent an organisation or a Member State.

*More details on EIP-AGRI Focus Group aims and process are given in its charter on:

http://ec.europa.eu/agriculture/eip/focus-groups/charter_en.pdf



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