

**A Road Map for innovating NWFPs value chains
for the
Mushrooms and Truffles iNet**



**Conclusions issued from the Scoping seminar – 19 & 20 June 2018
of the
Innovation Networks of Cork, Resins and Edibles in the Mediterranean basin
project**

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1. Introduction to the innovation networks (iNets)

1.1. INCREDIBLE project overview

Mediterranean forests are facing significant challenges at many levels. In the northern Mediterranean, rural abandonment leads to a rapid expansion of unmanaged forests and increased risk of catastrophic forest fires. In the southern and eastern Mediterranean, rural and peri-urban populations are putting pressure on forest resources. The lack of well-developed forest products value chains that can generate jobs and income can be seen as a common underlying factor that jeopardises the capacity to sustainably manage forest resources already menaced by climate change. Non-Wood Forest Products (NWFP) can be part of the solution, if they can contribute to a smart and inclusive bio-based economy that can create value from and investment streams for sustainable forest management. Developing existing potentials requires the collaboration and knowledge exchange between NWFP practitioners and scientists, and among regions. The INCREDIBLE project is designed to speed up the flow of credible, salient and useful knowledge from science and experience, in order facilitate innovation to happen.

Interregional Innovation Networks (iNets) are the core tool of the INCREDIBLE project to promote knowledge exchange on NWFP across the Mediterranean basin. These networks will allow to seed, collect, co-create and disseminate relevant technological, economic, innovative and research knowledge linked to the main NWFP value chains. iNets are innovation networks where individuals meet to bring forward and co-create knowledge on selected topics. While being interregional in their structure, iNets will be actively working at the local, national and international scales in terms of dissemination outputs and activities.

INCREDIBLE has developed five iNets for the main Mediterranean NWFP: cork, resins, aromatic and medicinal plants, mushrooms and truffles, and wild nuts and berries, to better process the issues of NWFP across the Mediterranean basin. Each iNet will aim to gather the best practical and science knowledge related to NWFP production, transformation and trade channels. Special attention will be drawn to cross-cutting sectorial issues.

Within the iNets, the goal is to achieve and implement innovations through the project. The project concept is to identify challenges and needs in practice for each iNet and explore methods to address them by creating the competences and contributions of many various actors within the iNet ecosystem. The innovations in this context have to be interpreted like an innovation process in which actors from different organisations participate on its creation. Key to this is successful stakeholder engagement, allowing the various actors of the iNet ecosystem to be involved and to be a part of the innovation process.

The participation of stakeholders relevant to the iNet regional ecosystems in the discussions and decision-making process is the best way to ensure that their own perspective and knowledge contribute to the project's outcomes. Stakeholder participation not only results in a better narrative with a richer picture of the iNet challenges, but also allows to better expressing the innovation objectives and the options to reach these goals. Successful outcome also requires dealing with barriers to the implementation of the innovation. These barriers will be discussed and explored during the activities of the iNet.

1.2. Mushrooms and truffles iNet narrative

Mushroom picking is a growing activity in European forests, and a long lasting tradition for several Mediterranean countries such as Italy, Spain, France, Portugal and the Balkans area. They grow

in almost all types of forest ecosystems across Europe and are mainly collected from the wild (with exception of cultivated truffles in Spain, France and Italy).

The benefits related to wild mushroom picking can be broad and when maximised can involve a variety of actors playing at the recreational level (e.g. occasional pickers), the commercial level (e.g. mushroom traders), as well as activities proper of the tertiary sector (e.g. mycotourism and leisure activities, education initiatives). However, often private or public landowners do not benefit from the revenues generated by these activities that can also cause friction between mushrooms harvesters and forest owners. In some cases, high harvesting pressures or conflicts between commercial and non-professional pickers can emerge. Most of the mushrooms species show a great ecological plasticity in regards to plant symbionts and environment, as long as there is enough humidity, and their production can greatly vary from year to year. This jeopardises stable value chains. Production levels can potentially be affected by harvesting intensities or harvesting technics. Truffles are considered the most profitable Mediterranean NWFP with a high potential for development. Truffle species (*Tuber magnatum* and *T. melanosporum*) are highly demanding in respect to ecological conditions and have been domesticated only in some regions.

As all edible forest products, there are significant challenges in relation to traceability for safety regulations and market transparency. Innovative value chain integration models are often valuable tools to share benefit across all involved stakeholders. In addition, the development of diversified harvesting models aimed to co-production can improve resilience of the mushroom and truffles value chain.

2. Scoping seminars

The scoping seminar was the first official meeting of each iNet. Its main goal was to create a specific road map for better targeting specific issues within its topic. Five seminars were organised by the iNet coordinators and they were held in Tunisia (Aromatic and Medicinal Plants), Spain (Resins, Mushrooms and Truffles), Portugal (Wild Nuts and Berries), and Italy (Cork). All iNet members were invited and a special attention was given to ensure the participation of key stakeholders. At the scoping seminar, stakeholders had an opportunity to validate previous work, to propose bottom-up, complementary activities and to contribute to the iNet future development.

The main objectives of each scoping seminar were:

- to validate the narrative, and to establish a road map for the development of the iNet. The object was to focus on the themes that will be addressed throughout the project,
- to manage expectations on what can be achieved,
- to give participants opportunities for networking.

At the scoping seminar, stakeholders gathered from all links of the value chain had an opportunity to share their opinion and bring up problems and difficulties of their sector. This was a unique chance for everyone to learn about challenges and to get a wider picture of the condition in the sector. Most of the stakeholders were from the country where the scoping seminar was organised but international stakeholders were participating too. It was interesting to local stakeholders to learn and compare the difficulties, qualities and solutions in other countries.

The number of stakeholders attending scoping seminars (Table 1) was higher than expected (targeted number was 30) in three of the events, which tells us that the stakeholders were well informed and interested in collaboration. Despite the different concerns among participants from different countries, and even among regions in the same country, the participants agreed on the identification of challenges as well as the priority themes for reinforcing the NWFP sector.

	Cork iNet	Resins iNet	Aromatic and medicinal plants iNet	Mushroom and truffles iNet	Wild nuts and berries iNet
	Number of participants				
Spain	1	28	4	48	4
Portugal	4	7	1		15
France		3	2	2	1
Belgium	1	1	1		
Greece			1	2	
Italy	20			2	
Croatia				2	
Tunis	1	1	37		
Total	27	39	46	56	20

Table 1. Number of participants at each scoping seminar.

Per iNet, this chapter summarises:

- the main outputs from each Scoping seminar;
- the improvements that this event brought to the value chain map (improved description or addition of new stakeholders and fluxes), and

- the priority themes on which the INCREDIBLE project should focus, those that would have a bigger positive impact on the value chain.

2.1. Scoping seminar report of the Mushrooms and truffles iNet

2.1.1. Summary output

The iNet of wild mushrooms and truffles is devoted to two non-wood forest products that share several similarities, but also have unique qualities and challenges. Therefore, the scoping seminar was organised in two different sessions, which took place in two locations. The first session (19th June) was devoted to wild mushrooms and was held in Soria (Castilla y León region, Spain), which is one of the leading world regions in the development of the wild mushroom value chain. The second session (20th June), was focused on the truffle sector, and the meeting was held in Sarrión (Teruel province, Spain), which, with 1,100 inhabitants, is the world centre of black truffle cultivation.

The number of stakeholders who participated in both sessions was higher than expected, with wide representation of the first links of the value chain, while the consumers were underrepresented (if we do not count all the participants who are also individual consumers). Most of the stakeholders were from Spain, but we also enjoyed the high participation from international truffle sector, including the president of the European Tuber group.

The programs of both sessions were very much appreciated by the participants, generating active participation. The documents previously prepared by the INCREDIBLE partners, including value chain and SWOT analysis were discussed in depth and new insights were identified and added to the final documents.

Despite the different concerns among participants from different countries, and even within regions in the same country, the participants agreed on the identification of challenges as well as the priority themes for reinforcing the wild mushrooms and truffle sector. The main challenges, which will inspire the interregional workshops are:

- marketing;
- management of truffle plantations;
- development of myco-silviculture approaches;
- regulation of access to the resource, taxation, labelling systems;
- training to the truffle value chain actors, mainly black truffle producers.

2.1.2. Description of new/better characterised actors and fluxes in the value chain

The value chain map was distributed during the scoping seminar stimulate the discussion. The wild mushrooms value chain was refined and the trading centres were included in the value chain. The direct selling to final consumer was added, connecting mushroom pickers with consumers, although this this relationship is only legally recognised in France. As a result of the discussion, the Wild Mushrooms value chain represented bellow was obtained (Figure 1).

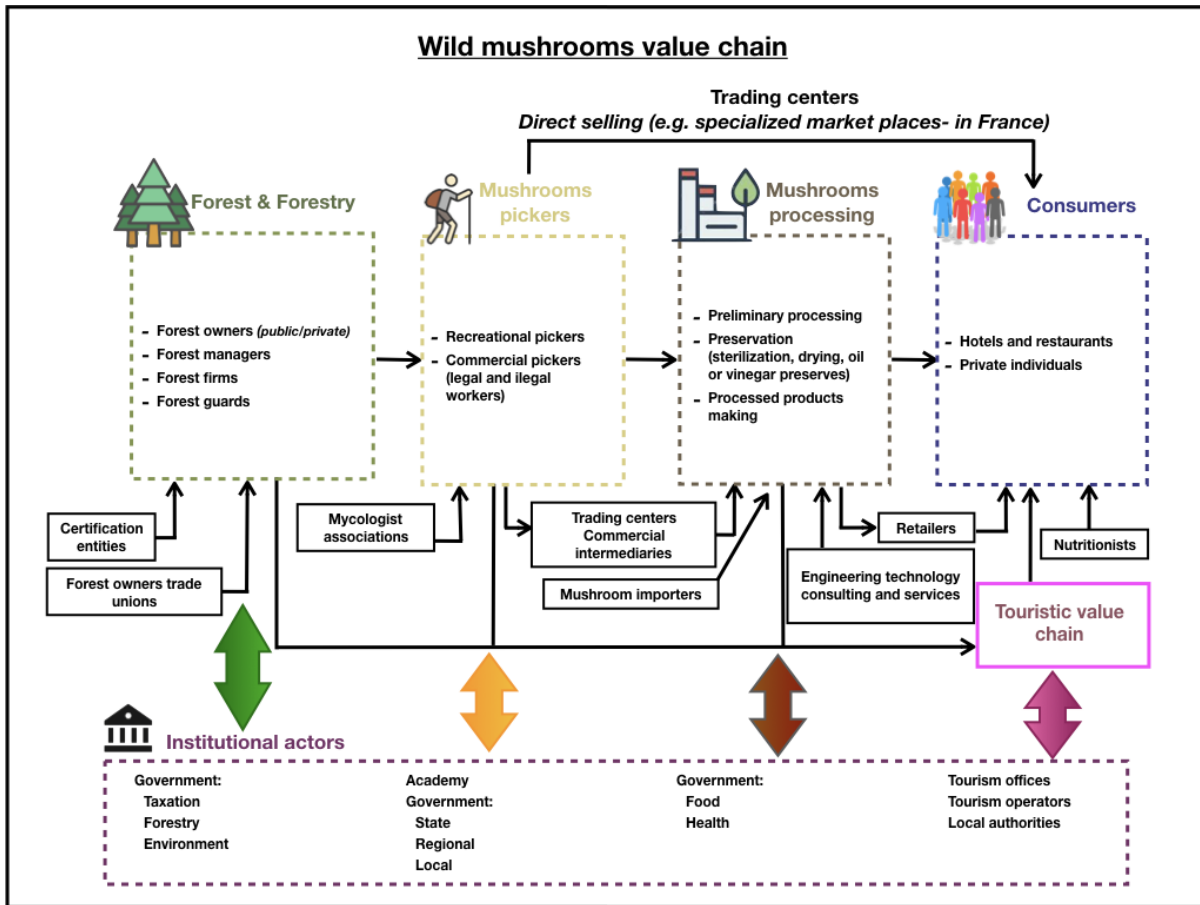


Figure 1. Wild mushrooms value chain map resulted from the scoping seminar.

The black truffle session was useful to review and complete the black truffle value chain map. Nurseries, engineering technology, consulting and services as well as truffle dog breeders and certification entities were included in the value chain. Water authorities were identified as part of the truffle ecosystem as there are issues related to water rights in irrigated truffle plantations in Spain. Also, the environmental departments were identified as part of the ecosystems as there are some administrative issues related to the conversion of pine plantations to truffle plantations in truffle-producing areas in Spain. Figure 2 illustrates the new completed and agreed truffle value chain map.

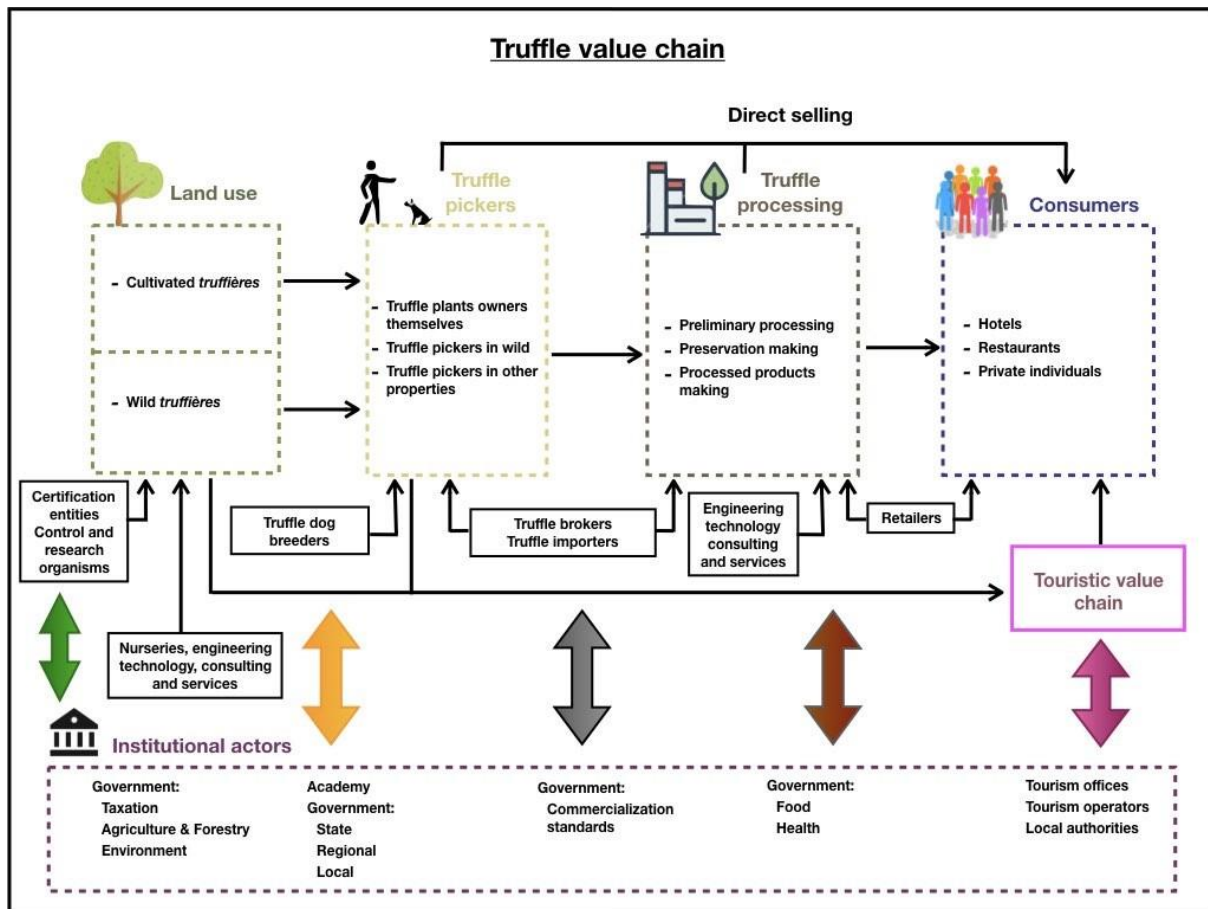


Figure 2. Black truffle value chain map resulted from the scoping seminar.

2.1.3. Priority themes to focus INCREDIBLE actions

The priority themes identified by the Wild Mushrooms and truffle iNet scoping seminar attendants are summarised by challenges based on the basic activities of the entire value chain:

SUSTAINABLE HARVESTING

- 1) Regulation of wild picking. This is considered a policy (legal) and social innovation challenge. Regulation includes aspects such as:
 - a. Taxation for mushroom and truffle picking activity;
 - b. Access to the resource, control of non-sustainable and/or illegal harvesting levels and management of potential conflicts;
 - c. Market transparency and traceability.

Domestication and sustainable production. Yearly fluctuations, variable qualities, lack of critical mass are elements that interfere with the development of strong value chains on these products. Identified challenges are:

- 2) Domestication of wild mushroom species. This is considered a research and communication challenge. Domestication can be achieved at different levels:
 - a. Improved yields through mycosilviculture;
 - b. Intensive cultivation.

- 3) Improved cultivation of truffles. This is considered a complex challenges involving research, policy and managerial innovations. It includes aspects such as:
 - a. Availability of certified high quality inoculated seedlings for truffle cultivation (policy and managerial challenge);
 - b. Optimisation of plantations management. Including aspects such as: improved management of insect pests and efficiency of irrigation;
 - c. Diversification cultivated truffle species (inoculation, management, irrigation, market development etc.);
 - d. Improved dialogue across stakeholders (water authorities, forest department) to generate a better-shared understanding of truffle production).

SUPPLY CHAINS ARRANGEMENTS OF MUSHROOMS AND TRUFFLES

The development of wild mushroom and wild truffles sector faces difficulties are associated with the nature of the products that are fresh and short lived and the nature of picking and collection in the wild that implies high volume fluctuations, grey markets and lack of transparency. These are mainly Policy and managerial challenges that can be summarised as the need for:

- Improved supply security and continuity (volume, regularity, quality) through cooperatives, digitalised buying sites;
- Improved product traceability from the forest to the fork, and effective control of non-standard products that could create confusion in the markets;
- Broadly accepted quality standards, labels and certification including chain of custody.

COMMERCIALISATION AND MARKET DEVELOPMENT

Wild truffles and mushrooms are still niche markets with large growth potential. There is little or no gastronomic culture on the potential of these products, outside some specific countries or regions within countries. There are some challenges related to:

- Leveraging the intrinsic characteristics of wild mushrooms and truffles (organoleptic, wild nature, links to rural development etc.) This complex challenge related to traceability. Labelling and brand creation and certification;
- Broadening culinary offer and traditions to increasingly incorporate wild mushrooms and truffles and education of consumers;
- New transformed products, precooked dishes and new formats;
- Durability of truffles and mushrooms, preserves and packaging.

CREATION OF VALUE AND TERRITORIAL LINKAGES

Gastronomy has proven a very relevant leverage to develop urban and rural tourism strategies that multiply the economic and social impacts of agro-food value chains. Current mega-trends of experiential tourism, nature based tourism, wild foraging and green care offer attractive opportunities for Mediterranean territories. However, successful mycotourism requires the concerted action of multiple actors. Research, policy and social innovations are needed. An in depth review of some successful cases can facilitate successful replication across the Mediterranean.

2.1.4. How can INCREDIBLE better contribute

As in other iNets, INCREDIBLE aims at sharing scientific knowledge, practical experiences and societal awareness. In this case, the focus will be placed on the following elements:

SUSTAINABLE HARVESTING

- Knowledge and experiences on resource estimation and sustainable harvests levels and technics;
- Review of existing regulations and practices in relation to access to the resource, traceability and taxation, including the use of innovative ICT solutions;
- Documenting examples of practices addressing equity through the value chain and conflict resolution;
- Existing knowledge and knowledge gaps in relation to domestication and cultivation of mushrooms and truffles. Identification of critical aspects in relation to productivity and sustainability.

COMMERCIALISATION AND MARKET DEVELOPMENT

- Improve awareness and knowledge of the gastronomic value of mushrooms and truffles (gastronomic culture);
- Identify tools to address frauds;
- Include durability and preservation of fresh truffles and mushrooms in the research agenda to be developed.

CREATION OF VALUE AND TERRITORIAL LINKAGES

- Review of ICT tools and approaches for implementing territorial marketing strategies;
- Replicability of Territorial marketing strategies will identification of strategic drivers and barriers;
- Identify best cases in the application of EAFRD regulation to support territorial development Strategies based upon NWFPs in general, mushrooms and truffles in particular.

3. Discussion and findings

3.1. Overview

In the period from 8th of May 2018 to 12th of July 2018 five iNet scoping seminars were held in Spain (two), Portugal, Tunisia and Italy, with the total number of 184 attendees, coming from different backgrounds, positions in the value chain and also diverse interests and expertise. They included land owners and managers (both public and private), government officials, collectors, processing industries and retailers of different sizes, industry and retail associations, intermediaries and service companies (e.g. nurseries, consulting, etc.), researchers and technicians from various disciplines and, finally representatives of boundary sectors, as hotel and restaurants. In general terms, the biggest interest on the scoping seminars was found among the industry/trader representatives (29% of the attendees; Figure 3) and private and public forest owners and managers (20%) and the research community (12%).

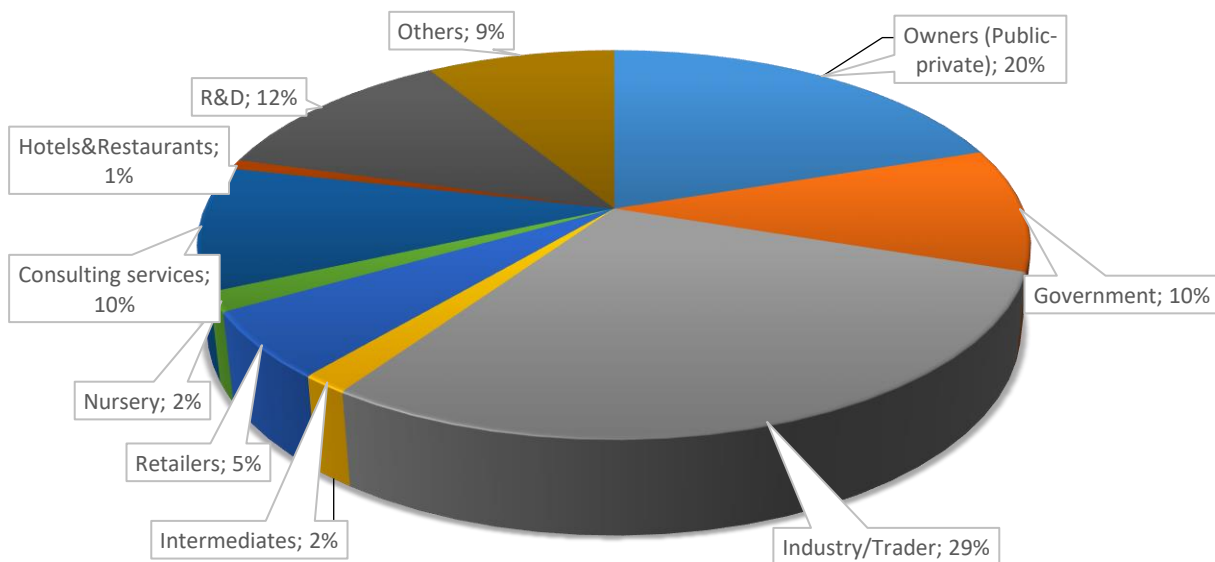


Figure 3. Percentage of attendees from all scoping seminars grouped by their value chain position.

This scoping seminars were aimed at better understanding the most relevant needs and opportunities for innovation and strengthening the respective value chains. The methodology was based on a combination of plenary, break-up groups and informal discussions during coffee breaks, lunch and fieldtrips. Starting point of all discussions was an understanding of all the actors and fluxes involved in the different value chains and their extended ecosystem. There was no attempt to generate consensus on a desired scenario for every non-wood forest product sector, as this could lead to roadblocks due to diverging interests among different actors of the value chains. The objective was rather to develop a collective assessment of the functioning of the value chains and the identification of challenges or opportunities, as perceived by the different actors. As expected, this approach facilitated an extensive discovery of themes and topics, the identification of new or better characterised actors and fluxes in the value chain. Similarly, no hard prioritising was sought although, in some cases, participants were asked to vote

priorities as a tool to stimulate discussions. The methodology was designed to rather capture all issues and priorities, and to further process and distil them in an iterative approach, to better understand them and to allow common priorities to emerge naturally.

Successful completion of the scoping seminars proved that the chosen methodology fully meets the expectations of project outputs. High rates of stakeholders and individual responses to join the scoping seminars is just one of the indicators. More important, the results of scoping seminars revealed precise problems, needs, expectations and possible solutions for problems in each of the five iNets. That clearly indicates that the project topic is highly relevant for the European NWFP sector as it is for the overall development of rural communities across Europe.

3.2. Innovation challenges in non-wood forest products in the Mediterranean region: common themes across iNets

Since the different NWFP are collected, produced, processed and marketed in different social-ecological systems (as a consequence of divers biophysical, socio-economic, technological and cultural aspects), different priority themes arose at each iNet scoping seminar. The analysis of the outcomes, however, shows common knowledge gaps and challenges for innovation. The identified cross-cutting themes are described below.

LONG-TERM AVAILABILITY AND SUPPLY OF NWFP IN A CONTEXT OF GLOBAL CHANGE

Understanding and mitigating the impacts of climate change

Climate change is recognised as a major threat to all forest ecosystems and is predicted to have especially intense impacts in the Mediterranean region. Higher temperatures and reduced precipitation will directly affect the composition, structure and productivity of forest ecosystems and thus, of non-wood forest products. How this will affect the production of NWFP and what are the options to mitigate this impacts is an area that needs research and knowledge transfer. While agronomic practices can be adapted for domesticated products (e.g. irrigation in truffle or chestnut), mitigation options for wild NWFP are less evident. The same can be said for emergent pests and diseases. Climate change can also affect the length of the production/collection period and increase the inter-annual variability in production, hampering the development of the value chains. In some cases, the impacts of climate change can be exacerbated by human activities. For example, irrigation of agricultural crops can reduce underground water availability for nearby forests, thus jeopardizing also the production of NWFP.

Sustainable production and harvesting

In the case of many wild NWFP, sustainable harvesting levels are not well understood. The condition and availability of the resource is not regularly monitored nor evidence-based harvesting levels are estimated or enforced. This situation can become critical as market develops and demands increases. Also because intense harvesting can concentrate in the most accessible areas. What would be the impact of increasing mushroom picking in long-term production? What is the impact of using rakes to increase harvesting by professional pickers instead of the traditional picker knife? What will be the long-term availability of rosemary for wild collection in a context of high picking pressures and climate change? How much resin can be produced in southern Europe under plausible climatic and social scenarios? How can NWPF primary processing industries can forecast their investments with such uncertainties? In some

cases, the lack of knowledge on future resource availability difficult rational business and policy decisions.

In the case of more domesticated products, there are still significant knowledge gaps in relation to, for example, genotype x site interaction for relevant characteristics as it can be cork quality in cork oaks stands or kernel productivity by stone pine groves. Management of pests and diseases are also a critical issue that requires increased knowledge generation and transfer. In all domesticated crops, optimization of irrigation to improve yields, quality and economic return with maximum efficiency is also a very relevant area (e.g. truffle, cork and stone pine).

UNSECURED AND IRREGULAR SUPPLY

There are also critical socio-economic challenges related a stable and secure supply of NWFP. Supply of forest products depend on individual non-professional collectors (mushrooms, wild truffles, some aromatic plants) and sometimes on professional crews working for periods, with inadequate labour conditions and limited knowledge on the sustainable collecting practices (mushrooms and AMP mainly). In some cases, there is lack of workers due to hard working conditions and relatively low income as it can be the case for resin and cork in high-income regions. This situation makes difficult the creation of stable value chains and in some cases limits the market expansion in well established industrial activities (cork, resin, some essential oils).

For all widely collected products, there is inadequate knowledge on the size of the market and its economic relevance. Black and grey markets are very important and there is a generalised lack of traceability. This, consequently, favours black and grey markets and also robbery, as in pine nuts, and the concurrence with uncontrolled substituting products from other regions (e.g. pine nuts from east Asia, mushrooms from Russia, etc.). The lack of traceability can have especially negative effects for those products used as food, in cosmetics and related to human health. New business organisations, improved or adapted regulation and registration of collectors, or mobile ITC are some of the promising innovations, either social or technological, that can help tackling some of these issues and that could be adapted and adopted more widely. However, firstly, challenges should be better understood.

REDUCED PROFITABILITY

The situation described above is partially related to the tight profitability of NWFP production and collection. Most of the wildly collected or only partially domesticated NWFP analysed in the different scoping seminars have limited capacity to generate sufficient income for producers (private forest owners, forest municipalities, etc.) or for collectors (resin tappers, AMP collectors, etc.). This is a structural weakness that in some cases almost totally prevents the development of NWFP business activities or that jeopardises its future. This is especially true in countries or regions with a high average income and explains the almost inexistent resin or cork production in France, or the incapacity to mobilise cork from the forest to meet the existing demands as it happens in Catalonia (Spain). Some social, managerial and technological innovations can help in improving NWFP production and harvesting profitability. These are related to mechanisation (e.g. pine nuts or chestnut collection, cork debarking, resin tapping), to harvesting methodologies more adapted to the socio-economic context (e.g. borehole resin tapping in timber-oriented stands), to silvicultural or agronomic practices that increase productivity (e.g. improved genetics, forest management practices that improve mushrooms yield, truffle plantations irrigation), to logistics, etc. Evidently, the development of high added-value products based in NWFP is a necessary

condition to maintain and improve the profitability for producers and collectors, although it does not guarantee equity and fairness within the value chain. At the same time, the recognition of the positive externalities produced by the NWFP production, as through PES schemes, is seen as a strategic component on the economic viability of, at least, cork and resin value chains.

In some cases, producers or collectors have weak bargaining power in relation to the primary processing industries and they are not able to get a fair compensation, or they feel so. In other cases, processor cannot mobilise the resource because they cannot meet the expectations of producers that may have unrealistic views on the market value of their products, as it can happen in cork. Improved awareness on market functioning, transparent and widely recognised procedures to measure quality or public price observatories can reduce tension within the value chain, along with contractual arrangements and new forms of collaboration among producers/collectors.

ACCESS TO THE RESOURCE

Across the Mediterranean region there is a large diversity of forest tenure regimes and different regulations on who and how can access wild resources. Free access to forest and the right to collect NWFP for all citizens irrespective of tenure is rooted in many countries. However, the risk of overexploitation or the need to manage conflicts between recreational collectors and professional collectors are fuelling the adoption of new regulations.

LACK OF AWARENESS OF CONSUMERS, POLICY MAKERS AND SOCIETY AT LARGE

The lack of awareness of the economic, social and environmental benefits that NWFP production provide is common among all five NWPF; for those that reach the consumer highly transformed (resins and AMP) as well as for those that are easily recognisable by end-users when eaten (mushrooms and truffles, nuts and berries) or used (cork). The lack of awareness is of different nature depending on the NWFP: knowing the origin of the product or the ecosystem services its production provides, being able to distinguish between a given product and its substitute, or simply identifying that a NWPF (or its derivatives) enter in the composition of a manufactured good.

In this case, the challenge is related to marketing. Already existing tools to tackle this challenge are marketing campaigns, product traceability labels and regulated geographical indications or designations of origin.

3.3. Cross-cutting areas for action

On the one hand, climate change, globalisation, urbanisation, tertiarisation are megatrends affecting the development and sustainability of non-wood forest products and explain to a large extent the challenges identified. Competition in the global markets with other producing countries and with alternative products put high pressures on profitability of raw materials (e.g. pine nuts, cork, resin, essential oils). Rural abandonment makes difficult to find labour. All this favours black and grey markets for products and labour to reduce costs. On the other hand, the emerging trends represent new, even immense, opportunities. Nature-based and experiential tourism, green care, societal preference for natural cosmetics and natural food are experiencing and increasing demand. The need to replace oil-based or non-renewable products with bio-based solutions in creating a new market pull for manufacturing and construction (cork or resin and other plant-based chemicals). Facing challenges and making the best of emerging opportunities

requires concerted action of diverse actors in multiple directions. The outcomes of the Scoping seminars allow us to highlight three domains that require specific attention as they can provide the necessary conditions for sustainability and innovation to happen.

BETTER FOCUSED RESEARCH AND IMPROVED KNOWLEDGE FLOWS

Research, development and extension capacities are very different between Mediterranean countries and there is much to be learnt from cross-regional cooperation. Some countries had a long tradition of using NWFP. The lack of research is often related to insufficient number of specialised researchers for some NWFP, non-existent financial and/or development programs to implement specific projects and the lack of interest from political and governmental structures. Research capacities are fragmented across countries and among institutions within one country. In the case of cork and wild nuts, there are different field trials, not always connected to each other, despite being highly complementary. Sometimes in-house research produced by companies (e.g. resin stimulants, new resin tapping technologies, etc.) is neither published nor disseminated. Usually, across the region, support for NWFP research and rural innovation is weak.

IMPROVED GOVERNANCE

Having better, stronger, more comprehensive governance frameworks for NWFP should allow for better decision-making by all actors, should facilitate stronger and more equitable value chain arrangements and contribute long-term social and environmental sustainability. Institutional arrangements and public regulation varies from country to country and between NWFP, becoming much weaker or inexistent as we move from fully domesticated products to completely wild products. In general, governance is considered fragmented, confusing, inadequate, limited or totally inexistent by INCREDIBLE project stakeholders.

In the case of wild NWFP, some Mediterranean countries or regions do have a regulation that covers aspects related to collecting rights, access to the resource or permits and taxes. However, this is totally absent in other. In some cases, existing regulation is not helping to facilitate cooperation and transparency inside the value chains or can even represent an obstacle for collection, production and trade. As an example, forest or environmental regulation, or the way it is interpreted by the competent authorities, can limit the establishment of new truffle plantations in forestlands in central Spain. Across the iNets, the need to overcome this problem is recognised as one of the most important. In the case of edibles, regulating quality, forest to fork traceability and allowing for effective protection of origin is a specific challenge.

Governance approaches, arrangements and procedures by private (e.g. companies) and other non-governmental actors (e.g. forest certification entities) are much less known. Formally adopted good practices codes or due diligence systems among collectors and processors are generally missing or have not been yet identified and properly described. Some NWFP are covered by sustainable forest management certification schemes (e.g. cork in PEFC and FSC), although they might not be generating the added value that could be expected or desired.

Addressing these and other related issues (market and environment, plant health regulation, incentives and PES schemes, irrigation rights, etc.) will greatly benefit from more structured public-private cooperation.

MORE EFFECTIVE COMMUNICATION FOR GREATER SOCIAL AWARENESS

When sustainably managed, the production, collection, and transformation of NWFP can generate multiple positive externalities: rural development, forest fire prevention, climate change adaptation and mitigation, etc. However these benefits are rarely recognised in the markets, where Mediterranean NWFP compete with petroleum-based counterparts (e.g. petroleum derivatives, plastic stoppers, etc.) and with imported products that can differ in quality and environmental performance (Asian pine nuts, Russian mushrooms, etc.). Stakeholders across the iNets are convinced that it is extremely important to increase the awareness about the current situation and existing potential for NWFP and the environmental, social and economic benefits that they can provide. Product, environmental and geographical certification schemes are seen as promising tools.

On the one hand, the actors in the value chain could better communicate outside their sector. On the other hand, the need for better communication along the value chains (between producers, processors, market and government) is clearly identified by the stakeholders. Between different stakeholders, there are different communication problems. Depending on the region or the country, the problems are identified as:

- reduced information flows between producers/collectors, traders and transformers;
- lack or not existent knowledge and technology transfer between actors of the value chain;
- lack of cooperation towards potential common goals such traceability schemes, quality assurance, joint marketing and certification;
- lack of awareness by policy makers on the barriers and opportunities for NWFP that translate into fragmented, inadequate or non-existing regulation.

Consequently, better dissemination of information between procedures for quality control and certification methods from certification entities, both for harvesting and processing is needed. For those sectors where we have good practices, dissemination between actors in the value chain should be increased. For the sectors where quality control and certification methods are not established, it is necessary to make a complete analysis and to set up good foundations so certification entities can produce a uniformed method for quality control and certification of every product in each iNet.

4. Roadmap for INCREDIBLE and beyond

The reports from each Scoping seminar are very concise; they perfectly represent the situation on the field and are a good starting point for each future regional or international events organised by the INCREDIBLE project. Adopting new knowledge and ideas to existing ones, spreading the existing discussions and trying to solve the small problems through networking guarantees successful future work of each iNet. The following discussion will try to gather the conclusions and propose next steps for each iNet based on the Scoping seminar reports.

4.1. Mushrooms and truffles iNet roadmap

Wild mushrooms are a food product which is picked pursuing an economic and/or recreation purpose. Mushroom pickers are not usually the forest owners and the legislation on property varies among countries. Activities derived from the mushroom value chain are dependent of different governmental legislation including forestry, environment, taxation, food and health. This presents a complex scenario in which different administrations have legislative competences on the wild mushrooms value chain. Mycotourism (including mushrooms and truffles) is well developed in certain areas, while is very recent or absent in other productive areas. The wild mushrooms and truffles sectors also coincide in the complexity of the legislation affecting the entire value chain. Truffles are also a food product, with different legislation affecting the value chain (sometimes considered as a forest product, sometimes as an agricultural product). Therefore, the different governmental legislations include agriculture, forestry, environment, taxation, food and health, and this adds complexity to the truffle sector.

Updated narrative for both wild mushrooms and truffles section encompasses all the partner countries, for which we can say that the discussion during the Scoping seminar well identified the current situation and differences between regional cases.

The mission defined during the Scoping seminar can be used as a motivation for future steps of this iNet: “The Wild Mushrooms and truffles actors are organised aiming to reinforce their value chains at different territorial levels (local, regional, state and international). They develop collaborative innovative projects, establishing procedures and transactions guaranteeing product traceability, recognised by the competent administrations. The normative is well adjusted to the mycological and truffle sector realities, driving the sector's growth and generating value for the rural areas”.

This iNet recognised good practices from other iNets that could improve the mushrooms and truffles sector, an effort that could be used in all other iNets.

Correspondingly, the iNet will focus on:

- compiling and sharing relevant knowledge on sustainable management of wild and domesticated truffles and mushrooms (e.g. mycosilviculture, enrichment, irrigation, etc.) and the potential impacts of climate change;
- documenting, analysing and evaluating in participatory set-ups existing or proposed cases of regulation, including aspects such as access rights, taxation, ITC tools, traceability, etc.;
- documenting and analysing replicability of mycotourism and other territorial marketing strategies, and

- facilitating the inclusion of mushrooms and truffles in the scope of vocational training and forest extension services.

5. Annexes

5.1. Access to scoping seminar reports and other materials

- Cork iNet: <https://incredibleforest.net/inet/cork>
- Resins iNet: <https://incredibleforest.net/inet/resins>
- Aromatic and medicinal plants iNet: <https://incredibleforest.net/inet/aromatic-medicinal-plants>
- Mushrooms and truffles iNet: <https://incredibleforest.net/inet/mushrooms-and-truffles>
- Wild nuts and berries iNet: <https://incredibleforest.net/inet/wild-nuts-and-berries>