FINAL FULL PROPOSAL FOR A NEW TASK FORCE

Strengthening Mediterranean nursery systems for forest reproductive material procurement to adapt to the effects of the climate change

1. Name of proposed Task Force coordinator, affiliation (including IUFRO position) and contact information:

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   Formerly Leader of IUFRO WP 2.02.13, this year he has requested to be replaced by Prof. Paraskevi Alizoti (Greece).
   Coordinator of WG4 “Forest Genetic Resources in the Mediterranean Region” of FAO Silva Mediterranea.

Co-Leaders:

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   E-mail: alizotp@for.auth.gr Function in the TF: IUFRO WP 2.02.13 Leader, “Breeding and genetic resources of Mediterranean conifers”.

   E-mail nicolas.Picard@fao.org
   Function in the TF: Mediterranean Forestry and Policy main stakeholder connecting Med. countries.

Table 1 - List of proposed Task Force members, and proposed roles in the Task Force. Some national organization and individual participants could be not recorded near IUFRO, but they are experts involved in the Silva Mediterranea and needed to develop activities. (*Y/N: Willingness to be active participant in the TF if it is established).

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FAO SM countries will collaborate at sub-tasks 1.1, 1.2, 2.2, 4.2: please, see the list at [http://www.fao.org/forestry/silva-mediterranea/89589/en/](http://www.fao.org/forestry/silva-mediterranea/89589/en/) other Mediterranean-like areas will be requested to join the TF. All participants are invited to contribute to sub-task 4.5.

**Foreword**

This proposal is presented on behalf of WG4 “Forest genetic resources in the Mediterranean Region” with the formal approval of the Committee on Mediterranean Forestry questions of FAO Silva Mediterranea (SM), at the 24th Committee meeting held in Brummana (Lebanon) on 1st – 5th of April 2019 (Report of the twenty-third Session of the AFWC/EFC/NEFRC Committee on Mediterranean Forestry Questions – Silva Mediterranea; file:///C:/Users/Fulvio%20Ducci/Downloads/3.6-Lebanon-...

The proposed TF topic may seem very technical and perhaps ambitious, but this relatively neglected topic is addressed to make basic scientific information available to maintain diversity in the forest nursery production chain, to apply serious and scrupulous certification criteria and, finally, to support the adaptation of future forests to environmental changes. This adds a further value to the ecosystem services provided by silviculture.

**Context and justification**

The accelerated degradation of forests in the Mediterranean region, due to the interaction of multiple natural and anthropogenic stressors, poses a serious threat to the diversity of forest genetic resources (FGR). The risk of irreversible losses of many endemic forest tree species/populations or unique marginal peripheral ecotypes is becoming nowadays more intense in this biodiversity hot spot region, due to the climate change effects. The socio-economic instability of the region contributes also to the intensification of these effects.

Faced with this alarming situation that threatens the forest heritage, national and international relevant bodies (EU, FAO, EFI, IUFRO...) require research outputs to develop strategies and actions for implementing the conservation and a proper management of forest genetic resources in view of future climate change scenarios. New technologies, such as based on GIS and MAS (Marker Assisted Selection), are becoming more easily available as time progresses and could become useful tools for the conservation and management of forest genetic resources.

In this socio-ecological context, however, the high importance of the nursery supply chain of the forest reproductive material (FRM) as a fundamental tool for managing forest genetic resources (FGR) has not been recognized yet even if Forest Nursery is usually considered a branch of Silviculture. However, it is largely neglected in both planning and applications, despite of its short-term effectiveness compared to the generally long times and uncertainties of the forest sector.

Thus, the above sector needs to be recognized for its significance, be strengthened in the genetic diversity hot spot regions and be decisively directed towards achieving a high adaptive value, through maintaining and enlarging genetic diversity of forest trees. These are key points to achieve ecological
and economic sustainability of future plantations and to succeed in efforts to reconstruct even entire ecosystems after extreme environmental episodes. An adequate contribution of the forest nursery chain to provide FRM with specific and/or extensive genetic variability and to support its adaptive capacity to the current and foreseen environmental changes due to climate change is required.

In all geographical areas with Mediterranean-type environmental conditions in the world, extreme climate events are becoming progressively more intense and frequent and may have also an impact to social and economic problems and the nursery chain can contribute to new forests and green belts. Those who know these areas also know how often the application of nursery practices is disregarded and not enough attention is paid to preserve and certify diversity and variability of reproductive forest materials.

Scientific research and its results can make a major contribution to the stakeholders at all levels as it can provide scientifically based proposals for the application of good practices, not only agronomic, but also related to the proper use of FRMs in the production process, up to their final placement.

These concepts are stressed by the FAO Global Plan of Action for forest genetic resources (2014) and by the Convention on Biological Diversity (2009), by the FAO COFO XXIV statements: http://www.fao.org/about/meetings/cofo/en/ . However, the proposed TF will be a source of knowledge also for other socio-ecological contexts in the world and a global perspective will be given by the participation of relevant IUFRO Units. The TF proposal can interact also with international existing networks as i.e. EFI-EUFORGEN (EUFGIS, http://portal.eufgis.org/) and can rely on the experience from scientists already involved in international networks as relevant IUFRO Divisions and Units and/or R&D projects as TreeBreedex, Trees4Future, B4est and more recently GENTREE (http://www.gentree-h2020.eu/).

**Problems**

Problems related to the use of FRMs and forest nurseries can arise in these regions because of: 1) poor variability levels and poor adaptive potential in the produced FRMs; 2) improper selection of FRM and trading; 3) lack of knowledge on the impact of nursery practices on the genetic variation of the produced FRMs; 4) little attention to certification and identification systems; 5) poor ability to adapt the supply chain to market needs related to the great environmental gradients of the Mediterranean regions and, likely, to the increased frequency of extreme events; 6) lack of shared strategies, tools and methods; 7)
poor forest economy and lack of attention from decision makers; 8) lack of awareness and knowledge to face new societal challenges; 9) technically inadequate forest nursery chains with poorly skilled staff and scarcely equipped nurseries, 10) low adaptability of the system to market and environmental changes. Deeply considered should be the phytosanitary problems arising from globalization. Global trade makes nurseries as a main pathway of introduction of alien pests and pathogens threatening natural and semi-natural ecosystems. A recent European data reported many nurseries infested by diseases without any symptom. As a consequence, asymptomatic seedlings are traded unspotted by phytosanitary services.

A targeted action is needed to: a) promote the appropriate scientific support and tools to the various stakeholders, and b) harmonize the different needs and knowledge aimed at increasing the seedling crop value.

An effective nursery supply chain, beside the agronomic nursery techniques, should nowadays consider the whole process, from the genetic improvement through the selection of different forest basic materials up to the development of decision tools for the proper management of FRMs in relation to the future scenarios.

**Objectives/Aims - General Objectives**

- The establishment of a regional strategy for the conservation and sustainable management of FGR is an urgent priority for FAO Silva Mediterranea i.e. for new plantations for ecosystem services and social/urban forestry.
- Enabling the Mediterranean countries to integrate into similar systems of conservation and management of FGR through international frameworks, such as EU directives and OECD scheme.
- Planning the phased implementation of the regional strategy by an integrated action among FAO Silva Mediterranea Working Group 4 and of IUFRO WP 2 02 13.
- This initiative will be also useful for the preparation of the future FAO 2023 State of Mediterranean Forests.
- To strengthen technical capacities in the field of monitoring and management of FRMs to keep their genetic variability intact and adopt their proper use, either throughout the nursery system, and at the sites of plantations.
- To have the opportunity to support the preparation of the upcoming 2023 State of
**Specific objectives**

To primarily develop an information base on Mediterranean FGR, conceived as a dynamic tool to adapt their conservation and management to future scenarios, several steps should be addressed as:

- to set the characteristics of a decision-making tool to be used for the nursery supply chain. This will enable making the right choices for planning new forest tree plantations/planning by considering the adaptation of FRMs, will follow that first step. Besides the usual requirements for forest basic materials fixed by rules at the international and national levels (i.e. OEDC scheme for forest reproductive materials [http://www.oecd.org/agriculture/forest/], EU Directive 1999/105/CE [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31999L0105&from=EN], etc.) more information should be required for seed stands and populations, especially referring to their marginality level and to their adaptive potential. Such aspects were particularly stressed by the Cost Action FP1202 “Strengthening conservation: a key issue for adaptation of marginal/peripheral populations of forest trees to climate change in Europe (MaP-FGR)” (https://www.cost.eu/actions/FP1202/#tabs|Name:overview), which involved scientists from 36 countries from Europe, northern Africa and Middle East. Particularly, this latter is one of the major genetic hotspots in this part of the globe, where marginal peripheral populations can be an important source of genetic information for ecosystems’ adaptation;

- in the above context, a GIS based tool (supported by a database) will be investigated and possibly settled to make available data on FGRs. Data availability is a prerequisite for FGRs' future monitoring and management under the pressure of rapid and intense environmental changes, thus contributing to protective/conservation strategies in the frame of FRM proper use. This targeted tool is subject of EUFGIS activities; however, an operational transfer functions developed in Nordic Countries for provenance will be also tested;

- an compiled regional register of basic materials will be the major output of the TF. Likely, such a tool will be basic to plan dynamic measures in relation to both legislative and adaptive needs driven by the occurring environmental changes. Before now, in 1997 M. Topak published with FAO a first “Directory of seed sources of the Mediterranean Conifers
(http://www.fao.org/3/AD112E/AD112E00.htm). The Directory was finalized on Conifers only and needs now to be reviewed and updated with new species and adapted with modern descriptors and indicators and tools as above described.

Alongside the above, compiled technical and scientific information and guidelines will be provided to the stakeholders, in order they can adapt their nursery networks based on shared scientific information.

Description of specific proposed Task Force activities, deliverables and timelines.

Task Force structure (Led by F. Ducci and co-led by N. Picard and E. Alizoti): Objectives will be targeted by several sub-Tasks, where the contribution of participants will be addressed. Being the work on a voluntary base, interaction among people and Tasks is mainly trusted on online contacts and already existing connections in the framework of shared research projects and it will be possible de visu only at meetings. Those will be basically two, profiting of the organization of periodical FAO COFO (Committee for Forestry) and FAO Silva Mediterranea Committee meetings. Possible offers to organize additional meetings will be welcome during the TF period.

Task 1: A database of FGR (Led by L. E. Paques)

1.1 Building an Information base on Mediterranean FGR (in situ ed ex situ) (Provisionally Led by L. E. Paques, P. Alizoti, F. Ducci). Several projects and networks in the world already provided several databases which can supply components for structuring a database template where FGRs can be recorded on a GIS base. The proposer can remember the experience in the framework of EU infrastructure Projects as TreeBreedex and Tree4Future recording in situ populations and their ex situ replications in international trials and national tests. The TF should directly address the possibility to record natural populations by introducing indicators and descriptors able to describe their marginality and their adaptive potential, if any. GENTREE (Bruno Fady) project can give a valuable support by introducing genetic indicators and descriptors.

1.2 Scenarios (Led by M. Marchi). Scenarios, preferably based on ‘niche modeling’ methods, should
be used to evaluate the present climatic context of FGRs and the potential risks related to the isothermal shift in these regions. GIS based data from participant countries should be used to place populations within the forecasted scenarios and to support strategies for future plantation activities, especially in those cases where assisted migration techniques would be required. Problems can arise concerning harmonization of different climate information systems, in this case the work can be simplified by representing climatic regions and their possible shift with respect to the seed stand location.

**Task 2: The register of basic materials and legislation (Seed stands) (Leaded by M.C. Monteverdi and R. Proietti)**

From the above 1.1. and 1.2 a seed stands list will be extracted and made available for technical uses according to the major international rules. Most of the required information is already included in national Seed Stand registers and needs to be transferred in the shared Mediterranean register.

**2.1 Developing a template (Leaded by... To be nominated).** This template will integrate the usual indicators/descriptors as requested by OECD Scheme, by the EU Directive, the Nagoya protocol, if required, and information on the marginality level, if any. The template will be on Microsoft Excel software, if the tool will be developed after the expiration of the TF, or it will be directly uploaded on line on the tools in the case it will run within the second year of the TF. Testing the Treebreedex/Trees4Future database Excel templates will be integrated with indicators descriptors from Rules, Cost Action FP1202 experience, and possibly EUFGIS. It is to be noted that a wide range of different experiences, technologies, methods, rules and tools is typical of this area and needs to be harmonized and possibly a minimum common denominator must be shared and made usable with the aim of achieving the main purposes set out above.

**2.2 The register (Leaded by G. de Dato and A. Khaldi).** Once the template will be ready, all national representatives will be requested to fill the 2.1 template with their national information. Most of information would be already available on national registers and recorded as Seed sources and Selected seed stands and, they are also in part already recorded as Gene Conservation Units (GCU) in EUFGIS.
Task 3: Testing and developing a decision-making tool at experimental level with some study case (Led by D. Ray)

3.1 Testing the effectiveness of Nordic transfer functions (developed for provenances) on Mediterranean Regions (Led by T. Skroppa)

3.2 Promoting the adoption of the EUFGIS Information System in the Mediterranean region (Led by M. Bozzano)

Task 4: Dissemination (Led by N. Picard and V. Garavaglia)

4.1 An Opinion Paper (Led by J. Stuntarf) of the TF will be compiled by members to be submitted to open access scientific journals as well as a policy brief will be prepared for a wider dissemination to stakeholders.

4.2 Good nursery Practices to manage FGRs in the chain. (Led by V. Ivtic and S. Maruthaveeran)

Nursery agronomy experts, forest socio-economists, geneticists and breeders, pathologists and eco-physiologists should interact to produce good practices guidelines addressed to keep the production sustainable, with high biodiversity and high levels of genetic variability. Risks from the spread of threaten pests and pathogens from the nurseries to the environment will be also considered among outputs.

4.3 Identification and certification. (Led by A. Santini and M. Bou Dagher Kharrat) FRMs trade legislation experts and breeders will interact to produce simple conceptual good practices for identity and certification, harmonizing the different international rules to produce shared documents to be suggested to the broader community.

4.4 Points 4.1 and 4.2 (Led by V. Garavaglia) will be integrate into the main product of the TF: the register of Mediterranean-areas seed stands. This will be compiled by the participants and made available on line by Silva Mediterranea.
4.5 **Meetings.** Two meetings will be organized as required in the TF call, to save money and time they will be organized in the framework of FAO activities as COFO and Silva Mediterranea where most of stakeholders and scientists can be supported for their attendance by the member states. In these frameworks, side events, seminars and working parties can be organized. These meetings can give the opportunity to networking people from similar climatic regions in the Western USA, Chile, Ethiopia, South Africa, Caucasus, Pakistan and Western Australia to establish interaction with the TF. Periodically, sub-task leaders can organize webinars and video conferences to coordinate and to share activities and information.

**Proposed activities**

The Proposer wishes to appeal to mobilize the necessary expertise to support the implementation of the TF strategy. This will be achieved by the plan following below in the framework of the different tasks and after working groups of experts will be created at the start of the TF thanks to short video-conferences:

**Year 1**

- Mining and recovering of information and descriptors from existing tools and databases (e.g. Euforgen / Eufigis, Cost FP1202, Treebreedex, Trees4Future, B4est, GENTREE ... Months 1-6).
- Preparing the database template including current indicators and descriptors as well as the new ones relevant to describe marginality, risks and possibly adaptive value (Months 1-6);
- Member states review their lists/registers of national basic forest materials and upload the information on
  - the prepared template (months 1-12);
- Preparing a map of the regions with present and future climate scenarios where seed stands from the GIS database are located and harmonized with respect to the descriptors and indicators developed from different networks and the already existing databases (month 1-12);
- Sub-task webinars and videoconferences organization.
- Testing EUFGIS and Nordic countries tools (months 1-18).
- First task meeting in Rome at FAO, (month 8)
- Promoting, transferring, testing and/or adapting already existing models of decision-making tools and guidelines for a sustainable conservation FRM management in the Mediterranean area (i.e.
EUFGIS, Trees4future or Transfer function such as https://www.skogskunskap.se/rakna-med-verktyg/foryngring/plantval-tall/ in Scandinavian countries) (months 1-18).

**Year 2**

- Continuation of the register development and of the predicted species distribution ranges under different climate change scenarios (months 12-18).
- Producing guidelines for good practices to preserve biodiversity and genetic variation through the nursery system (months 12 - 24)
- Producing guidelines to integrate and compile the register of FRMs on this topic (FAO and CREA can help to print online these outputs), together with promoting scientific papers on the Task Force topic (months 18-24 + 6 if necessary).
- Producing an opinion paper of the TF (month 13 – 24 (+6 if needed),
- Producing a policy brief for wider dissemination among stakeholders (months 13-20)
- Final meeting on main outputs and possible issues of the Task Force (during FAO COFO or Mediterranean Weeks) (months 22-23).
- Sub-task webinars and videoconferences organization (periodical).

5. Project framing with FAO and IUFRO and other networks

Interaction with:

**FAO Silva Mediterranea** (http://www.fao.org/forestry/silva-mediterranea/en/):
- WG4-FGRs in the Mediterranean Region, coordinator Fulvio Ducci (CREA, Arezzo, Italy)
- WG7-Urban and peri-urban Forestry, coordinator Fabio Salbitano (UNIFI, Florence, Italy).

**IUFRO Units involved or to be involved:**

- **Division 1 Silviculture**: 1.04.00 Agroforestry, 1.06.00 Restoration of degraded sites (involved), 1.07.00 Silviculture and management of threatened and endangered tree species.
- **Division 2 Physiology and genetics**: 2.02.13 Breeding and genetic resources of Mediterranean conifers (involved), 2.04.00 Genetics (requested), 2.09.00 Tree seed, physiology and biotechnology (involved).
- **Division 3. Forest Operations Engineering and Management**, 3.02.00 Stand establishment and treatment (involved).
- **Division 4 Forest Assessment, modeling and management**: 4.05.04 Competitiveness of regional and international value-added chain (requested).

- **Division 6 Social aspects of forests and forestry**: 6.07.00 Urban Forestry (involved).

- **Division 7 Forest health**: 7.02.00 Pathology (requested), 7.02.03 Vascular wilt diseases (involved), 7.03.00 Entomology.

- **Division 9 Forest Policy and Economics**, 9.04.01 Economic evaluation of multifunctional forestry (involved)

- **Task Force “Forest adaptation and Restoration under Global Change”** (involved)

**EU Projects** (participants from…) and networks:


- **B4est**: [http://b4est.eu/](http://b4est.eu/), Coordinator Catherine Bastien (INRA, Orléans, France)


- **Cost Action FP1202** “Strengthening conservation: a key issue for adaptation of marginal/peripheral populations of forest trees to climate change in Europe (MaP-FGR): [https://www.cost.eu/actions/FP1202/#tabs|Name:overview](https://www.cost.eu/actions/FP1202/#tabs|Name:overview) and [http://map-fgr.entecra.it/](http://map-fgr.entecra.it/), coordinator Fulvio Ducci (CREA, Arezzo, Italy)


Budget table listing major activities and funding sources, if known – indicate if these funds are already secured

Table 2 - The participation at TF is on a voluntary base and only already available data and tools and individual experience will be required, therefore only time efforts. Most outputs will be prepared in the routine framework of already running research activities. Being on a voluntary base, travelling expenses for attending meetings will be individual or for some countries covered by FAO, they were estimated on the base of experience in COST Action coordination.

<table>
<thead>
<tr>
<th>Output and activity description</th>
<th>Secured by…</th>
<th>Cost estimation €</th>
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Travel x person averaged (3 Day/meeting) | Individual budget partially covered by FAO for some countries | 1500
---|---|---
Policy Brief editing on FAO Silva Med, two languages Web page, 10 pages, 4000 words) | FAO Forestry, Silva Mediterranea | 2600
Opinion paper | Editing voluntary based, open access scientific journal | 0
Compiled Mediterranean Register of Seed Stands by FAO as a book (120 p. 40,000 words) | FAO Forestry, Silva Mediterranea | 7800
Seed Stand database on line on FAO Silva Med and EUFGIS | FAO Forestry, Silva Mediterranea | 4600
Compiled scientific/technical Guidelines and good practices editing on an ASR special issue on line | Annals of Silvicultural Research, CREA, Italy | 2000
Total (excluding individual travels) | | 20900

**Narrative addressing the following:**

1.1 **Contribution to implementation of the IUFRO Strategy.** The proposed TF would match with the 3 main goals of the IS 2015/19: Goal 1 *Research Excellence: Strive for quality, relevance and synergies*, Goal 2 *Network Cooperation: Increase communication, visibility and outreach*, Goal 3 *Policy Impact: Provide analysis, insights and options*, with special focus on the following Themes: 1 *Forests for People*, 2 *Forests and Climate Change* and 4 *Biodiversity, Ecosystem Services and Biological Invasions*. It may be considered too technically addressed, but it will be a great opportunity for science to support technicians in a neglected field that may have a great impact on the genetic variability of planted forests and their adaptive capacity, in very often neglected areas, with difficult environmental and socio-economic conditions, where the existing, of high importance and in several cases unique FGRs are generally poorly considered. Nursery chain is the first step towards achieving the sustainability of plantations either for productive, or for urban health purposes. This TF wishes to network and make synergies to produce the first milestone in the development of shared and efficient framework on the above topic, based on scientific knowledge.
1.2 How the proposed Task Force will strengthen cross-divisional interaction on specified topics related to IUFRO 2019-2024 Strategy's Emphasis Areas and/or Institutional Goals, and how the Task Force will complement and/or expand activities of existing IUFRO Divisional units. A nursery system can be considered a temporary small ecosystem where several factors of human and natural origin play a role in preserving genetic variability and diversity. A safe and equilibrated nursery ecosystem will be basic to establish healthy, economically and ecologically sustainable long-term ecosystems (forests for the future). Approaching with a holistic forestry view on forest nursery is a relatively new challenge for scientists and this is the reason why interaction among IUFRO Divisions, Units and other non-IUFRO bodies is required.

1.3 Specific contribution of the proposed Task Force to addressing broader policy processes or interdisciplinary science-policy initiatives. The trade of FRMs is nowadays very easy and fast thanks to globalization. Anyway, for its effects on natural environments, this trade needs to be better regulated either to avoid alien species invasions either to avoid maladaptation and sustainability problems. Superficial approaches and a scarce scientific knowledge in the system are serious risks for future plantations, particularly in the frame of adapting to and combating the climate change effects. The scientific community should strongly support the Mediterranean regions primarily by improving their nursery networks as major tools to preserve and properly use their precious and sometimes unique forest tree genetic resources. The mere fact of realizing a shared information on the seed forests of the Mediterranean regions and convincing the different countries to adopt effective identification and certification systems, would be a great result of the TF. For this reason, we propose an activity frame as simple as possible, despite the complexity of the involved disciplines.

Arezzo, 26.06.2019

Dr. Fulvio Ducci

Main reference literature


Concept Notes and full proposals should be sent to John Parrotta, jparrotta@fs.fed.us, with a copy to Renate Prüller, prueller@iufro.org.