Genmeda

NETWORK OF MEDITERRANEAN PLANT CONSERVATION CENTRES

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# Odissea Seminum

GENMEDA Newsletter

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GENMEDA **Newsletter** - Odissea Seminum

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**Cover photo:** Monitoring of ***in situ*** conservation action at the Elafonisi area, Crete.
Photo: Mediterranean Agronomic Institute of Chania

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Odissea Seminum = The Odyssey of Seeds

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# EDITORIAL

Exactly 20 years ago, the founding partners of the GENMEDA network met for the first time and decided to present a project aimed at the conservation of Mediterranean flora. Thus, GENMEDOC was born, the first of many projects that during these two decades have enabled the network to grow, stabilise and today be able to face the many challenges.

At the beginning, we were nine partners from four European countries (France, Greece, Italy and Spain), then partners from Morocco and Tunisia joined and by the time the network was established, the number of partners had already grown to 13 and could also count on research institutes from Egypt and Malta.

In little more than a decade, the number of research institutes and associations that have joined has doubled and today the network has 25 members from 13 countries contributing to the conservation of the Mediterranean flora genetic resources.

Many projects have been successfully concluded and many are in progress, but the most important thing is that links have been created between people and institutions that have deepened over time and are based on selfless cooperation and mutual esteem. The only real interest of all partners is to work together for the conservation and enhancement of the Mediterranean flora.

For these reasons, I believe that GENMEDA is one of the most successful examples of transnational collaboration that has resulted in solid professional relationships and even more so in friendship and true brotherhood. The different research teams complement each other and despite the physical distances, increased today by the pandemic situation, they have managed to keep the network, activities and exchanges alive.

Photo by Conservatoire Botanique National Méditerranéen of Porquerolles

We have seen many students and scholarship holders grow around us who are now established researchers and professors in the international arena; many of us who twenty years ago were only young researchers have now reached professional maturity; others who were already established, today continue to support GENMEDA and like great sages guide us in the choices and decisions we constantly have to make.

In a world that is divided over everything and that too often sees arrogance and overpowering prevail, the GENMEDA network instead represents the union of peoples and fights for the conservation not only of plant diversity, but also of the cultural diversity of the Mediterranean Basin.

Odissea Seminum wants to contribute to the dissemination of these principles of the GENMEDA network, to make known the value of this Mediterranean diversity and to encourage an ecosophical approach that is not limited to the plant world.

Life is made to share, GENMEDA was born to share.

Gianluigi **Bacchetta**, GENMEDA President

ARTICLE

# Orchid-related research and activities at the NKUA Seed Bank and Research Team

Oikonomidis S., Koutsovoulou K., Georghiou K., Thanos C.A.

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The National and Kapodistrian University of Athens (NKUA) Seed Bank constitutes, arguably, the oldest seed bank for native wild plants in Greece. The Seed Bank was established in 1991 by the Assistant Professors (and currently Professors Emeriti) Kyriacos Georghiou and Costas A. Thanos. The Seed Bank currently hosts more than 700 seed lots from 403 taxa; 56 of these taxa belong to the family Orchidaceae and are represented by 120 seed lots. Both scientific responsibles of the Seed Bank are currently active as supervisors or associates of scientific projects and have accumulated significant experience in both seed biology (mainly germination ecophysiology) and plant conservation (both *in situ* and *ex situ*).

**Figure 1.** *Cephalanthera cucullata* in full flower, in the Plant Micro-Reserve of Koustogerako (Crete). The entire plant shoot (in the left) is 20-25 cm tall.

The earliest actions for conserving the orchids of Greece in the NKUA Seed Bank date about 20 years ago with the **LIFE project** CRETAPLANT (LIFE04 NAT/GR/000104, scientific coordinator Prof. Emer. Costas A. Thanos) implemented in collaboration with the plant conservation team of the Mediterranean Agronomic Institute of Chania (Crete). One of the target species of the CRETAPLANT project (2004-2007) was the Cretan endemic *Cephalanthera cucullata* (Figure 1), a Community priority (92/43/EEC), mycoheterotrophic orchid, characterised as EN by both the 1995 and 2009 Red Data Books of the rare and threatened plant species of Greece. The species shows declining populations, mainly affected by overgrazing. During the project, a Plant Micro-Reserve at Koustogerako was established through fencing of a 12 ha area for the control of grazing. During the 15 years of annual monitoring of the PMR, a 3-fold increase of the population has been observed (Oikonomidis et al. 2021), signalling a remarkable success of the particular **Plant Micro-Reserve of *Cephalanthera cucullata***. Trials for the *ex situ* propagation of the species have been repeatedly made as well but, as it is known for most of the *Cephalanthera* spp., their germination is particularly difficult in asymbiotic cultures and thus no positive results have been obtained so far. Even though no germination was achieved till now, it is quite interesting that the latest viability tests for all the seed lots collected and stored in the NKUA Seed Bank, showed that a considerable percentage of seeds collected during the project (~20-30%) still remain viable.

**Figure 2.** Post flowering *Ophrys kotschyi* in the Plant Micro-Reserve of Mitsero (Cyprus). The inset shows a flower of the species

During the same period of CRETAPLANT implementation, our team worked (2005-2008) on two low-budget, **NKUA funded projects** (under the call name Kapodistrias) for the *ex situ* conservation of plant diversity of Mt. Hymettus (coordinated by Prof. Emer. Costas A. Thanos). Through the implementation of these projects, the locations of several species of orchids in Mt. Hymettus were recorded while for two orchid species, seed collections for long-term storage were made.

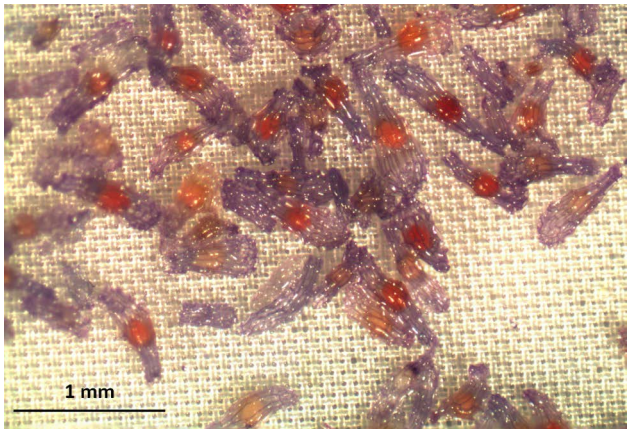


**Figure 3.** Viability staining in *Ophrys kotschyi* seeds with the use of the double-staining technique (tetrazolium and trypan blue, Magrini et al. 2019)

In a subsequent **LIFE project** (PLANT-NET CY / 2010-2013, scientific coordinator Dr. Costas Kadis), a **Plant Micro-Reserve for *Ophrys kotschyi***, a threatened orchid of Cyprus, was established in Mitsero (Figure 2). The NKUA team contributed to the *in situ* monitoring of this endemic orchid of Cyprus (Eliades et al., 2020) and to the study of its seed biology as well, both by elaborating a successful germination protocol (Koutsovoulou et al., 2013) and by storing several lots of the species in the NKUA Seed Bank. Recently, after 10 years of storage, the viability tests of these seed lots indicate that they still remain viable (Oikonomidis et al. 2021) without significant changes, especially for the seeds produced by cross fertilization (Figure 3).

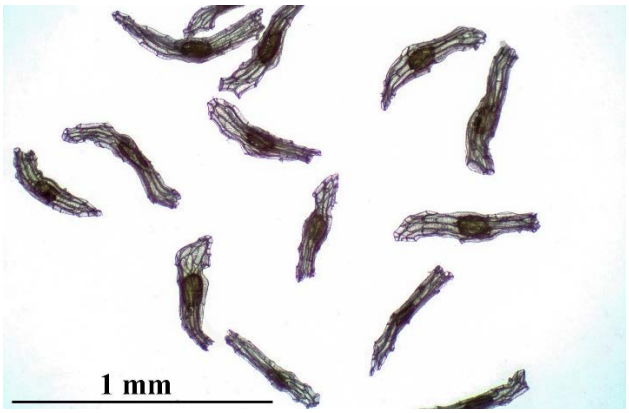


**Figure 4.** Seeds of *Neotinea maculata* under a stereomicroscope

In addition to the two LIFE projects and the two nationally funded ones for the conservation of Mt. Hymettus plant diversity, **four Diploma Dissertations** concerning orchid germination and *ex situ* conservation have been implemented under the supervision by Prof. Costas A. Thanos (Velianiti 2011, Peppa 2011, Ambelakiotou 2015, Oikonomidis 2019). These student studies resulted in the collection of 34 taxa, represented by 60 seed lots (Figure 4), while protocols of successful germination for several of these species have been proposed at national or international conferences (Velianiti et al. 2009, Peppa et al. 2011, Oikonomidis et al. 2018).

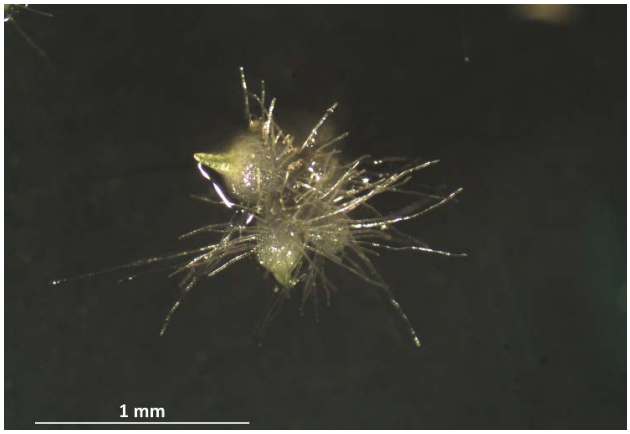


**Figure 5.** Protocorms and rhizoids of *Anacamptis sancta*

Starting early in 2020, a **PhD Thesis** (**S. Oikonomidis**) aiming to investigate the seed biology of the orchids of Greece was launched under the supervision of Prof. Emer. Costas A. Thanos. Within the context of this work, 22 new taxa and 60 new collections of orchids have already been added in the NKUA Seed Bank. Currently, a total of 56 taxa, i.e. more than one third of the orchid flora of Greece are conserved in the NKUA Seed Bank. During the ongoing PhD research, both the germinability (Oikonomidis et al. 2020, Oikonomidis & Thanos, 2021) and the longevity of the collected species are investigated (Figure 5). In addition, a database for the orchids of Greece and their functional traits is, currently, under development. Upon completion, the database will include all the data of our lab as well of the available national and international literature about the orchid species occurring in Greece and it will be hosted online along with an app, also under development, for the identification of the orchids of Greece, based on image recognition AI.

Starting in March 2022, a **new project in collaboration** with the **Royal Botanic Gardens of Kew** was launched. The new project entitled "Conserving the Flora of the Balkans: Native Plants of Greece (RBG KEW)" aims to the *ex situ* conservation of 500 native species of Greece and among those several orchid species will be collected and stored in the NKUA Seed Bank and in duplicates in the Millennium Seed Bank of RGB Kew. In the first year of the project, the priority species list

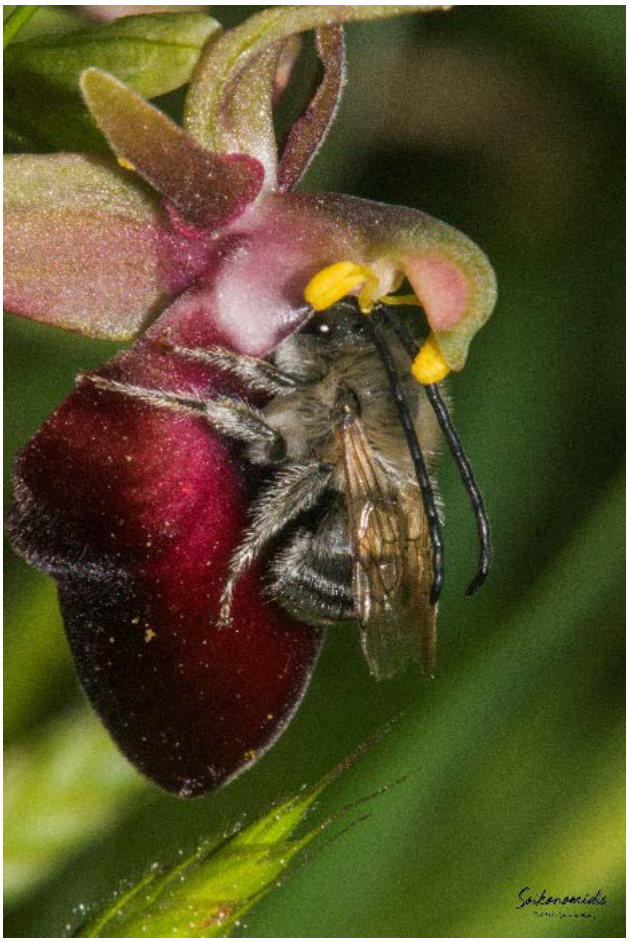

**Figure 6.** *Ophrys helenae* with a typical pollinator of the species

for collections contains 34 orchid taxa, i.e. 1/5 of the orchids occurring in Greece.

Lastly, even though the main focus of the work with orchids at the NKUA Seed Bank lies on their conservation through long-term seed storage, considerable effort is also being invested in the study of germination behaviour and seed longevity for the entire orchid flora of Greece. Finally, it is worth adding that certain important observations have been made in regard to the pollination of orchids. Especially in the case of *Ophrys helenae* and in collaboration with the University of Ioannina, two species of Coleoptera of the genera *Trichodes* and *Pygopleurus* (Oikonomidis et al. 2017 & 2021) have been recognised as true pollinators of the species (Figure 6), shedding further light on the pollination of the genus *Ophrys*.

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# BOOK REVIEW

## Diaspores of the Balearic Islands – a superb new book

GRADAILLE, J. Ll., BONET, J. (2022) **DIÀSPORES. Fruits I llavors de la Flora balear. Dispersió**. Ed. Fundació Jardí Botànic de Sóller - Museu Balear de Ciències Naturals. SÓLLER. 548 pp., ISBN 978-84-09-37211-9. [2036 photos and 58 illustrations, all in colour] (Fig. 1)

The Balearic Islands, a well known archipelago to the east of the Spanish mainland and a top touristic destination, constitute an autonomous community and a province of Spain with a recognised Balearic nationality and two official languages (Catalan and Spanish). The Archipelago is comprised of four major islands, Mallorca, Menorca, Ibiza and Formentera, as well as numerous minor islands and islets, with rich and wonderful native vegetation, typical of the western Mediterranean Sea but also very reminiscent of the entire Mediterranean region.


**Figure 1.** The front (right) and back (left) covers of the book

It was in November 2018, during the 2nd Mediterranean Plant Conservation Week (La Valetta, Malta), when my long-time friend Pep Lluis Gradaille informed me about his plan to author a book on seeds and their dispersal for the Balearic Flora. Of course, the inception of the project was much earlier and the material now presented in this beautiful volume represents almost four decades of meticulous observations, measurements, experiences and photographs on the various aspects of seeds and their movements in the highly diverse Balearic plant life. I must confess that it has been a real pleasure and privilege for me to help in a modest way (mainly regarding the dispersal modes of several plants) as well as witness the development and the successful completion of this venture. Pep Lluis has been instrumental in the publication of this volume as he personally conceived the notion of the book, artistically designed its contents and wrote the entire text (apart from Prof. Traveset's chapter). He even conceived and supervised the exquisite renderings for the different types of dispersal (drawn by Marcelo Pintos, in pp. 28 to 35, see Figs 2-4), as well as the life-cycle sketches (drawn by Francesca Bennàsser) and several pages with ethnobotanical information.

The main focus of this book is Seed (and Fruit) Dispersal for the Flora of the Balearic Islands. Already known since prehistoric times, seed dispersal is scientifically discussed for the first time in the botanical works of Theophrastus, the founder of Plant Science. Plant diaspores are virtually the only mobile forms of the sedentary terrestrial plants and serve two functions of critical importance for their survival and evolution, namely gene spread and reproduction. There have been several works that describe and classify (some of them quite elaborate) the various modes of dispersal but a simple, beginner's approach would suffice to include

**Figure 2.** Artistic rendering of balochory (ballistic dispersion) in *Euphorbia* sp

anemochory, hydrochory, zoochory, autochory and achory/barochory (i.e. dispersal driven by wind, water, animals, mechanisms inherent in the plants themselves and virtually no specialised mechanisms, respectively). The study of seed dispersal is a very important and lively topic of plant biology and ecology. Many books, dissertations and scientific articles have been written and we already understand a lot about this fascinating and extremely diverse subject. However, there is much more that we need to know, especially for the Mediterranean Region, both at a local and an overall level. Therefore, this book may serve as a nice contribution to our understanding of the dispersal spectrum of a typical, insular Mediterranean flora. Out of the 376 plants described, one third (33.8%) are anemochorous, one fourth (24.5%) are barochorous (i.e. achorous), 21.3% zoochorous (mostly by birds and ants), 11.2% hydrochorous and 7.7% autochorous (mostly ballistic). Is this dispersal spectrum similar with those in other areas around the Mediterranean? What about the overall dispersal spectrum of the entire Mediterranean and its similarities/differences with other biomes? These are questions we would love to address or hear about in the near future!

The Introduction of the book (similarly to the rest of it with the description of plants and their diaspores) is written in 3 languages (Catalan, Spanish and English) and includes (i) a preface about the objectives and the content of the book (4 pages), (ii) a short presentation of the plant world with a focus on morphology, classification and importance of fruits and seeds (9 pages), (iii) a short but very informative and well written essay entitled 'The importance of seed dispersal on the functioning of plant communities and ecosystems', authored by Prof. Anna Traveset (4 pages) and (iv) a final section on the various modes of seed dispersal (particularly for the Mediterranean Region) and their relevant terminology and etymology (6 pages). In total and for all 3 languages: 84 pages.

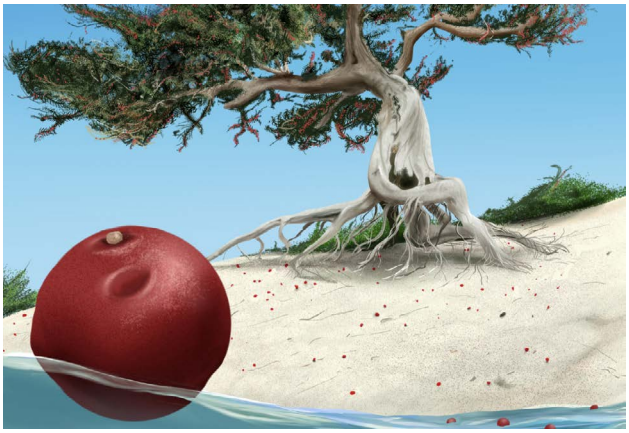


**Figure 3.** Artistic rendering of barochory and hydrochory (thalassochory) in *Juniperus macrocarpa*

The main part of the book (covering about 430 pages, from p. 85 to p. 513) is devoted to the description of 376 different plants and their diaspores. 29 are allochthonous species (non native in the Balearics, most of them exotic but some are from other parts of the Mediterranean) but all of them are naturalised and commonly

**Figure 4.** Artistic rendering of endozoochory in *Taxus baccata*

met in many places around the Mediterranean, thus widely considered as an integral part of our environment. 10 are seedless (ferns and allies) but their sori and spores are treated analogously to seeds as they basically serve the same function. The sample of these 376 taxa constitutes a quite fair representation (nearly 25%) of the Balearic Flora and spans about 100 families and 270 genera.

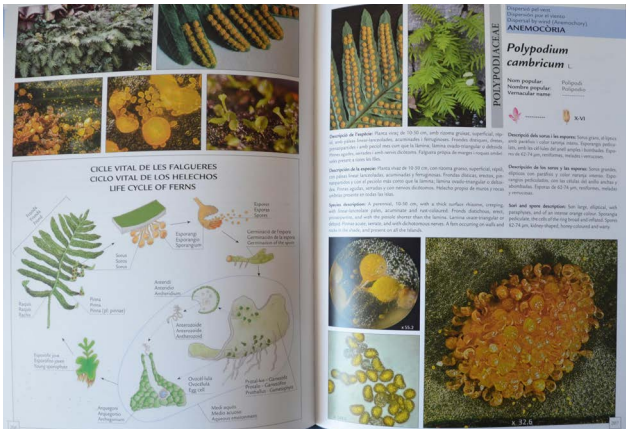



**Figure 5.** The life cycle of ferns (p. 206) and *Polypodium cambricum* (p. 207)

Each page of the book is devoted to a single taxon (two pages for some selected taxa). Each page is a trilingual information sheet (see Figs 5-7), providing a short description of the particular plant (including habitat, distribution and chorology) and a morphological account of its fruit and seed as well as its primary dispersal mode. It goes without saying that the limelight is stolen by the stunning seed photographs (usually in high magnification and superb detail).

The last part of the book hosts 3 very useful Indices of scientific names for the plant species described, arranged alphabetically according to (a) the family they belong, (b) the scientific name of each taxon (including synonyms) and (c) the dispersal mode of their seeds (then family, then taxon name). At the very end of the book we find a general index (table of contents) and a short bibliography.

A few words about the authors. Josep Lluis GRADAILLE TORTELLA is a leading authority, very well known

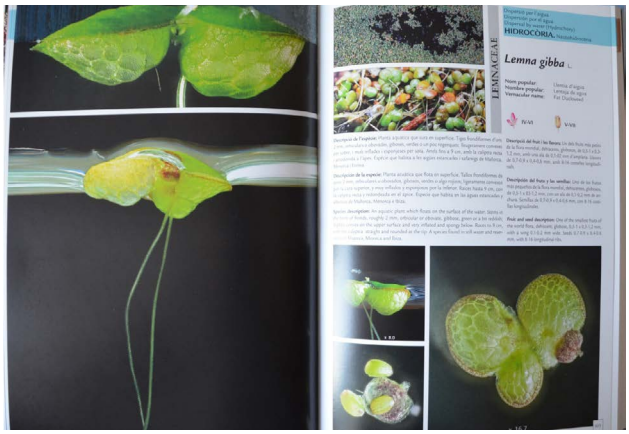



**Figure 6.** Flowers and fruits of *Lemna gibba* (pp. 404-405)

to the Mediterranean plant diversity and conservation community through the ENSCONET and GENMEDA networks and several other activities as well. He was born in 1946 in Palma de Mallorca and was since his early years attracted by the beauty of the plant world and realised the importance of conservation. Topographer by profession, he was invited (in 1980) to participate in the creation of the Museum of Natural Sciences of Soller (in the island of Mallorca); right from the beginning he proposed and insisted in the parallel creation of an accompanying garden dedicated to the conservation of the threatened flora of the Balearics. The initial project was designed in 1990, and as early as in 1992 the first part of the Botanical Garden of Soller (JBS) was inaugurated. In 2003, the garden construction was finished and a Botanic Institute along with a Centre of Investigation, Conservation and Experimentation on Plants were also created. Pep Lluis has been the first Director of JBS for almost thirty years (until his recent retirement) and, under his skilled guidance, the Botanic Garden of Soller has flourished and grown into an important national and international player in the plant conservation world. Josep BONET CAPELLA was also born in Palma de Mallorca in 1952. He is a self-made master of photography with a very long-standing interest in nature and plants. He has turned a professional photographer and he is very keen in constructing and adapting his cameras, in particular towards macro photography, specialising in capturing in detail the beauty of flowers, fruits and seeds. Basically, all the seed pho-


**Figure 7.** Two examples of zoochory (myrmecochory) in two Balearic endemics (pp. 478-479)

tos of the book are his. The majority of plant and habitat photos are from the archive of Pep Lluis Gradaille while some 60 photos were provided by 8 additional sources (for Credits and Acknowledgements see pp. 515 and 517).

The book comes in the form of a luxurious, A4-sized, coffee table volume which makes excellent armchair reading but both its printing quality and its weight (2.7 kg) obviously do not allow carrying it outdoors. I would suggest to the authors and publishers to consider the release of this book in the form of a paperback field guide, in a smaller format and with perhaps a flexible, practical cover, as a service to the field enthusiasts.

Finally, the authors and their collaborators have to be congratulated on compiling and publishing this excellent volume. It is a real treasure of knowledge and an aesthetic delight; as the authors suggest, this work might lead to an extensive treatise of the Diaspores of the Iberian Peninsula. I would add that this book serves as a brilliant example of what can be implemented with other regional Mediterranean floras; and this could eventually lead to an integrated discourse (and why not a GENMEDA target) of seed dispersal and plant diaspores for the entire Mediterranean area.

The Foundation of the Botanic Garden of Soller and Balearic Museum of Natural Sciences (Fundació Jardí Botànic de Sóller - Museu Balear de Ciències Naturals) is the publisher of this book and the only sales point: you can contact them and place your order by phone (+34-971634014) or by email (mvicens@jardibotanicdesoller.org); the price is 65€ (plus shipping), very reasonable indeed for such a high quality book.

In conclusion, this book is an absolute must-have for everyone interested in fruits and seeds and to all lovers of our marvellous Mediterranean plant world, as well.

Reviewed by Costas A. Thanos,
Prof. Emer., NKUA Seed Bank (June 2022)

# PROJECTS

## Life SEEDFORCE: a new project focused on plant translocation

Bonomi, C.[1*], Bacchetta, G.[2], Bavcon, J.[3], Buhagiar, J.[4], Casolo, V.[5], Ceriani, R.[6], Cristaudo, A.[7], Di Martino, L.[8], Dixon, L.[9], Fabrini, G.[10], Mariotti, M.[11], Raimondi, S.[12], Salmeri, C.[13], Villani, M.[14] , Magrini, S.[15*]

Developing successful plant conservation projects is a challenging task and requires an inclusive and multi-disciplinary approach, putting together diverse expertise to address all critical issues for a successful outcome. An integrated in-situ and ex-situ approach can yield numerous benefits and offer opportunities to showcase to the public the actual plants that conservationists aim to protect, in order to build participation and support from the local community.

The recently approved Life+ SEEDFORCE adopts such an approach (LIFE20 NAT/IT/001468 - Using SEED banks to restore and reinFORCE the endangered native plants of Italy and cross-border regions). The project aims at improving the conservation status of 29 Annex II species reported in bad conservation status in Italy according to the 2013-2018 report on the trends of habitats and species according to art. 17 of the Habitats Directive. Seedforce will both improve habitat conditions, removing or mitigating threats to the target species survival and will actively reinforce decreasing populations with well-targeted plant translocations. The project includes preparatory actions to assess the genetic make-up of the target species and populations, model the current species climatic envelope and project possible future scenarios, taking into account trophic dependencies in the target species. The outcome of such preparatory actions will be used to prepare the propagation mix best adapted for each site to be used for plant translocation, either reintroduction or population reinforcement. Once identified, key threats will be removed or mitigated, and the target populations will be reinforced or re-established in extinct sites.


The SEEDFORCE partnership at the kickoff meeting in Trento (Italy)

A series of engagement activities have been devised to gain public support and to involve farmers that in most cases can influence the long-term conservation of many plant species in secondary habitats.

The project includes 11 partners from RIBES, the Italian seed bank network, and 3 partners from bordering regions in France, Slovenia and Malta.

**Keywords:** plant translocation, Natura2000, unfavourable conservation status

[1]Museo delle Scienze di Trento, Trento (Italy), [2]Banca del Germoplasma della Sardegna, Hortus Botanicus Karalitanus, Università degli Studi di Cagliari, Cagliari (Italy); [3]University Botanic Gardens Ljubljana, Ljubljana (Slovenia); [4]Department of Biology, University of Malta, Msida (Malta); [5]Dipartimento di Scienze AgroAlimentari, Ambientali e Animali, Università degli Studi di Udine, Udine (Italy); [6]Centro Flora Autoctona della Lombardia / Parco Monte Barro, Galbiate (LC) (Italy); [7]Dipartimento di Scienze Biologiche, Geologiche e Ambientali, Università degli Studi di Catania, Catania (Italy); [8]Parco Nazionale della Maiella, Sulmona (AQ) (Italy); [9]Conservatoire botanique national méditerranéen de Porquerolles, Hyeres (France); [10]Dipartimento di Biologia Ambientale, Sapienza Università di Roma, Roma (Italy); [11]Dipartimento di scienze della terra, dell'ambiente e della vita, Università degli Studi di Genova, Genova (Italy); [12]Legambiente Nazionale, Roma (Italy); [13]Dipartimento di Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche, Università degli Studi di Palermo, Palermo (Italy); [14]Centro di Ateneo Orto Botanico, Università degli Studi di Padova, Padova (Italy); [15]Banca del Germoplasma della Tuscia, Università degli Studi della Tuscia, Viterbo (Italy).

## Eating the wild: Improving the value-chain of Mediterranean Wild Food Products (WFP) – WildFood

Issam Touhami, INRGREF

The overall aim of WildFood (June 2020 – May 2023) is to promote the implementation of joint innovative strategies by involving different actors of the Wild Food Products (WFP) value-chain in the Mediterranean area, focusing on selected products (mushrooms, truffles, pine nuts & Aleppo pine seeds, aromatic plants, acorns and berries) in view of improving their quality and safety controls and sustainability.

The specific objectives are:

- Analyse and compare the situation of the WFP value-chains and actors in Med PRIMA-communities and identify gaps between current knowledge and its practical implementation
- Design and demonstrate innovative solutions for tackling the pressing challenges of the WFP value-chains in terms of quality and sustainability by exploring existing business models and control systems in all stages of the chain
- Facilitate the market access of Med companies and increase the added value of local products by implementing innovative marketing strategies, targeted dissemination and outreach activities

- Strengthen the integration among the main agro-food value-chains actors promoting partnerships and new models of mutual collaboration, as well as, social inclusion and entrepreneurial business culture
- Facilitate the adoption of technological and organisational innovations by smallholders and SMEs through capacity building and targeted business support as well as interactive knowledge-exchange.

**Funding bodies:** Partnership for Research and Innovation in the Mediterranean Area (PRIMA Initiative) & National Funding Agencies

### Partners

- Forest Science and Technology Centre of Catalonia (CTFC)-Espagne
- Promotora d'Exportacions Catalanes (PRODECA)-Spain
- Instituto Superior de Agronomia (ISA)-Portugal
- National Research Institute of Rural Engineering, Water and Forests (INRGREF)-Tunisia
- Institut National de Recherche Forestière (INRF)-Algeria
- Cooperativa de Usuarios do Freixo do Meio, (CRL)-Portugal
- Agriculture Extension and Training Agency (AVFA)-Tunisia
- Slovenian Forestry Institute (SFI)-Slovenia; NABATIA-Algeria

## SEA4FENNELMED

Issam Touhami, INRGREF

Innovative sustainable organic sea fennel (*Crithmum maritimum* L.)-based cropping systems to boost agro-biodiversity, profitability, circularity, and resilience to climate changes in Mediterranean small farms

The main objective of SEA FENNEL4MED is the introduction of new sustainable organic sea fennel (*Crithmum maritimum* L)-based cropping systems, able to cope with limited resources (fresh waters/fertile soils), environmental constraints (biodiversity loss, chemical pollution) and climate changes related risks (soil salinization, water drought) for the enhancement of food production stability over time and increase of farmers' incomes.

### Partners

- Forest Science and Technology Centre of Catalonia (CTFC)-Espagne
- Promotora d'Exportacions Catalanes (PRODECA)-Spain
- Instituto Superior de Agronomia (ISA)-Portugal
- National Research Institute of Rural Engineering, Water and Forests (INRGREF)-Tunisia
- Institut National de Recherche Forestière (INRF)-Algeria
- Cooperativa de Usuarios do Freixo do Meio, (CRL)-Portugal
- Agriculture Extension and Training Agency (AVFA)-Tunisia
- UNIVERSITY OF EGE-Turkey

# MEDLENTISK project: Valorisation of lentisk tree and its non-wood forests products

Issam Touhami, INRGREF

**Objective** The "MEDLENTISK" project co-funded by the Erasmus + Programme of the European Union wishes to promote the exchange of good practices around the Mediterranean on the little-known lentisk tree and its fixed oil. It is still produced in a traditional way, which influences the yield and quality of the extracted product. The composition and therapeutic virtues of this oil have also been little studied, even though this shrub is found throughout the Mediterranean area and seems to have significant qualities. In order to do so, 6 partners from the South, East and North of the Mediterranean Sea have come together to improve interest and access to scientific and practical knowledge on lentisk tree's fixed oil.


Co-funded by the Erasmus+ Programme of the European Union

www.aifm.org/fr/page/medlentisk

## Partners

The project was implemented together by the AIFM, coordinator, with 5 partners, from 5 Mediterranean countries:

- University of Cagliari (Italia)
- Mediterranean Agronomic Institute of Chania (Greece)
- National Institute for Research in Rural Engineering, Water and Forestry (Tunisia)
- Technical University of Bursa (Turkey)
- Provence Model Forest Association (France)

The MEDLENTISK project "Good practice guide on lentisk fruit oil: from the field to the laboratory" is available at https://aifm.org/en/resources-en/medlentisk-good-practice-guide-on-lentisk-fruit-oil-from-the-field-to-the-laboratory/

# IN MEMORIAM

## In memory of Vernon Heywood

We recently received the sad news of the death of Professor Vernon Heywood on Saturday 17 September at the age of 94 -and very close to 95-, after a convalescence that had taken him away from conferences and meetings, but not from Botany, in the last period. As you know, Dr. Heywood has been the most important botanist for plant conservation worldwide, and a brave defender of the Mediterranean flora.

Professor Vernon Heywood at the 2nd Mediterranean Plant Conservation Week in Malta in November 2018

He was Professor of the Universities of Liverpool and Reading (UK) and Honorary Fellow of the Royal Botanic Garden in Edinburgh. Vernon was a great taxonomist and systematist who published and edited numerous articles and books, including Principles of Angiosperm Taxonomy (1963), the famous work Flora Europaea (1964-1980) and their known Flowering Plants of the World (1978, with several further editions and reprints) and Flowering Plant Families of the World (2007). He was the author of more than 400 scientific papers and book chapters.

Vernon has been heavily involved in plant biodiversity conservation as Chief Scientist at IUCN -where he also promoted the creation of the Specialist Group on Medicinal Plants- and he was founder and first Director of Botanic Gardens Conservation International (BGCI). In addition, he has been a tireless advocate of the role of botanical gardens in plant conservation and much is owed to him in relation to the definition of ex situ and in situ conservation. He was also responsible for defining concepts such as anthropogenic diversity and all the relationships between plants, animals and other diversity.

Vernon Heywood was editor of Global Biodiversity Assessment (UNEP, 1995) and one of the authors of the three-volume series Centres of Plant Diversity (WWF & IUCN, 1994-1997). Additionally, he has been a main pioneer for the inclusion of invasive alien species and climate change in conservation policies, advising numerous international entities (FAO, CBD, Council of Europe, etc.) and making reports which have influenced decisively to advance against their effects in the five continents.

Throughout his life and scientific career he worked extensively for the knowledge and conservation of the Mediterranean flora. In fact, his doctoral thesis was made in Southern Spain, where he lived for years. We had him as a guest speaker at the Mediterranean Plant Conservation Week in Malta in 2018, as a hiking companion at numerous OPTIMA conferences and also as a member of the CBNMP Scientific Committee.

Vernon Heywood has been, without doubt, the most celebrated and awarded botanist and plant conservationist worldwide, giving lessons throughout the five continents and receiving numerous awards and honours (Gold Medal of OPTIMA, Medal of the Royal Botanic Gardens Edinburgh, Linnaeus Award Planta Europa, Hutchinson Medal of the Chicago Horticultural Society, Gold Badge of the Canarian Botanic Garden, etc.). He was honoured as Regent Lecturer or Honorary Professor at the Universities of California at Riverside and Mendoza (Argentina) and the Institute of Botany of Nanjing (China), and as Honorary Fellow of the Linnean Society of London.

Until the start of the pandemic in 2020, he travelled the world to tirelessly defend biodiversity conservation and we marvelled at his extraordinary energy! Many of us will remember this militant scientist who enlightened our discussions with great wisdom, humility and kindness, not forgetting his oh-so-British touch of humour. We would like to pay deep and admired tribute to a giant for plant conservation and knowledge, Vernon Hilton Heywood (1927-2022).

Rest in peace.

Gianluigi Bacchetta[1], Emilio Laguna[2], Frédéric Médail[3]

[1]President of GENMEDA; [2]Coordinator of GENMEDA Steering Committee; [3]Professeur des Universités / Professor, Institut méditerranéen de biodiversité et d'écologie marine et continentale (IMBE), Aix Marseille Université

# EVENTS

## GENMEDA General Assembly meetings 2022 & 2021

Kokkinaki A.[1], Gotsiou P.[1], Fournaraki C.[1], Laguna E.[2], Meloni F.[3,4], Porceddu M.[3,4], Bacchetta G.[3,4]

[1] Mediterranean Plant Conservation Unit, CIHEAM Mediterranean Agronomic Institute of Chania; [2] Centre for Forestry Research and Experimentation - Regional Ministry of Agriculture, Rural Development, Climate Emergency and Ecological Transition - Region of Valencia; [3] Centre for the Conservation of Biodiversity (CCB), Department of Life and Environmental Sciences, University of Cagliari; [4] Sardinian Germplasm Bank (BG-SAR), Hortus Botanicus Karalitanus (HBK), University of Cagliari

The GENMEDA General Assembly annual meeting of 2022 was held in Cagliari, Sardinia, 28 September 2022, along with a series of other events involving GENMEDA members, all organised by the University of Cagliari - Hortus Botanicus Karalitanus (HBK). The other events were the BESTMEDGRAPE project International Conference, the ceremony to celebrate the 25 years of the Sardinian Germplasm Bank (BG-SAR) and the SEEDFORCE project workshop.

The GENMEDA meeting took place with both physical and on-line participation of a total of 39 participants. The current network activities, member activities and projects, and future prospects were presented and discussed.

In 2021 the General Assembly annual meeting, organised by the Mediterranean Plant Conservation Unit of CIHEAM Mediterranean Agronomic Institute of Chania (MAICh), had been held in Chania, Crete, 27 September 2021. The meeting took place on the 1st day of the 3rd Mediterranean Plant Conservation Week, 27 September - 1 October 2021, which was co-organised by GENMEDA. There was both physical and on-line participation of a total of 38 participants.

### GENMEDA General Assembly meeting of 2022 highlights

Arrangements in progress for future events:

- The 4th Mediterranean Plant Conservation Week (4MPCW) is organised by two GENMEDA members, the Centre for Forestry Research and Experimentation (CIEF) of the Valencian Region and the Botanical Garden of the University of Valencia (JBUV). It is proposed to take place at the Botanical Garden of Valencia, 23-27 October 2023. The main proposed topic is to link species conservation - ex situ and in situ - with a broader systemic approach closer to the principles of ecological restoration. To date the Organising Committee is formed by GENMEDA members CIEF, JBUV, IUCN, MAICh and HBK.

GENMEDA meeting, Cagliari, 28 September 2022

- The next GENMEDA annual meeting will be organised by the CIEF and held in conjunction with the 4MPCW in Valencia, October 2023.
- GENMEDA has been invited to organise a session on ex situ conservation at the XX International Botanical Congress in Madrid, 21-27 July 2024.
- The Botanical Garden of Rome, Sapienza University of Rome (BGR), GENMEDA member, is organising the X EUROGARD Congress (European Botanic Gardens Congress) that will take place in Rome in 2025.

The 3 GENMEDA Associate members since 2021 become numerary members and 2 more institutions become new Associate members, increasing the number of GENMEDA members to 27.

GENMEDA meeting, Cagliari, 28 September 2022

**New numerary members:**

- IUCN/SCC – Mediterranean Plant Specialist Group (MPSG), Switzerland
- Botanical Garden of Rome , Sapienza University of Rome (BGR), Italy
- Tuscia Germplasm Bank - University of Tuscia (TGB), Italy

**New associate members**:

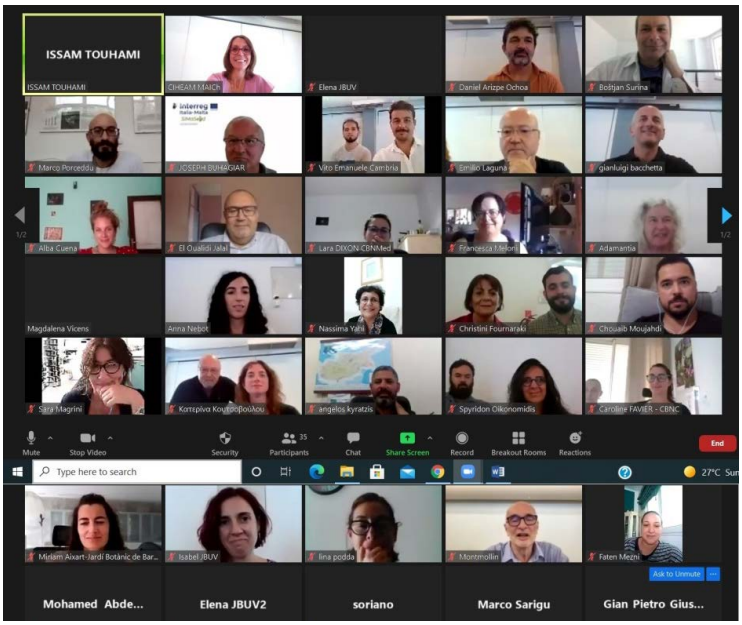
- International Association of Mediterranean Forests (AIFM)
- Sicilian Plant Germplasm Repository of the University of Palermo (SPGR/PA), Italy

## GENMEDA General Assembly meeting of 2021 highlights

A plaquette was offered to Antoni Marzo, recently retired delegate of CIEF, for his contribution to the establishment and progress of the GENMEDA network.

Some ongoing projects involving GENMEDA members were presented: MEDLENTISK, BESTMEDGRAPE, a new LIFE project in Spain: LIFE Teixeres - Conservation and restoration of relict Taxus baccata woods in the Valencian Region, the SIMASEED Project, and others.

The 4 Associate members become numerary members and 3 more institutions become new Associate members, increasing the number of GENMEDA members to 25.




GENMEDA meeting on-line group photo, Chania, 27 September 2021

**New numerary members:**

- Botanical Garden of Hamma (JEH), Algeria
- Institute of Mediterranean & Forest Ecosystems-Hellenic Agricultural Organization “DEMETER” (FRIA-HAO “DEMETER”), Greece
- RIBES network (the Italian network of seed banks), Italy
- Natural History Museum Rijeka (NHMR), Croatia

GENMEDA meeting group photo, Chania, 27 September 2021

**New Associate members :**

- IUCN/SCC – Mediterranean Plant Specialist Group (MPSG), Switzerland
- Botanical Garden of Rome , Sapienza University of Rome (BGR), Italy
- Tuscia Germplasm Bank - University of Tuscia (TGB), Italy

GENMEDA elections took place after a term of 4 years. The newly elected representatives are:

**President:** Gianluigi BACCHETTA (HBK)

**Secretary/Treasurer:** Adamantia KOKKINAKI (MAICh)

**Steering Committee coordinator:** Emilio LAGUNA (CIEF)

**Steering Committee members:** Lara DIXON (CBNMed), Sara MAGRINI (RIBES), Joseph BUHAGIAR (DBUM), Boštjan SURINA (NHMR), Evangelia DASKALAKOU (FRIA).

# MEDLENTISK, valorisation of lentisk tree and its non-wood forests products

## Antalya, Turkey 2022, 21-25 March - Seventh Mediterranean Forest Week.

Issam Touhami, INRGREF

Four communications were presented in this MEDLENTISK project side event:

1. Use of *Pistascia lentiscus* for phytoremediation: The Sardinian experience: Gianluigi Bacchetta (University of Cagliari)
2. Development of health- promoting products containing lentisk oil derivatives: Maria Manconi (University of Cagliari)
3. Information about seedling production, establishment of mastic tree plantations and related works done by governmental and private sector around İzmir, Turkey: Neşat Erkan (Bursa Technical University)

4. *In vivo* protective effects of *Pistacia lentiscus* fruit fixed oil from Jijel region (Algeria) against cyto and genotoxicity induced by xenobiotics: Lamia Benguedouar (University of Jijel)

The main ideas discussed at the conference can be summarized as follows:

1. The outcome of plants loaded with heavy metals in the event of phytoremediation with lentisk shrubs
2. The importance of creating a lentisk value chain
3. Impacts on local development and involvement of development agents.

# 3rd transnational MEDLENTISK project meeting

## Tabarka, Tunisia, 8-9 June 2022

Issam Touhami, INRGREF

The MEDLENTISK partners met one last time for the 3rd transnational project meeting in Tabarka, Tunisia.

The first day was spent in the meeting room to refine the best practices guide that they will share very soon.

The second day was spent at the GDA Oued El Maaden to discover their activities, including the production of lentisk vegetable oil.

# BESTMEDGRAPE project events: two international conferences during 2022

Francesca Meloni[1,2], Alba Cuena-Lombraña[1,2], Gianluigi Bacchetta[1,2]

[1] Centre for the Conservation of Biodiversity (CCB), Department of Life and Environmental Sciences, University of Cagliari, Viale S. Ignazio da Laconi 11-13, 09123 Cagliari, Italy

[2] Sardinian Germplasm Bank (BG-SAR), Hortus Botanicus Karalitanus (HBK), University of Cagliari, Viale S. Ignazio da Laconi, 9-11, 09123 Cagliari, Italy

The BESTMEDGRAPE project (New Business opportunities & Environmental suSTainability using MED GRAPE nanotechnological products), funded by the ENI CBC MED programme, is in its last year and is sharing the obtained results with the Mediterranean scientific community, stakeholders, experts and public at large with two international conferences.

Grape as a traditional crop in the Mediterranean area has a strong innovation potential, which has not been effectively exploited yet. People working in the grape cultivation sector are generally focused on improving the quality of grape and wine, but usually don't consider how to make the most out of grape processing residues such as pomace or grape seeds. Thus, the aim of our project was to support the creation of new start-ups by transferring scientific and technological knowledge on local grape cultivars and the exploitation of wine by-products as a source of bioactive compounds that can be transformed into innovative commercial health products.

The potential entrepreneurs involved in the technology transfer path set up by the project partners

Vineyards in Tunisia

Soon we will see the birth of the start-ups that will benefit from the vouchers financed by our project, based on the knowledge shared in the process of technology transfer and business creation set up by the partners in the involved countries: Italy, France, Tunisia, Lebanon and Jordan.

The first conference took place in Beirut (Lebanon), hosted by the Lebanese partners Saint Joseph University of Beirut and Berytech, on 11 and 12 July; it focused on 5 different topics:

- Characterisation of grape and other Mediterranean cultivars
- Extraction and characterisation of polyphenol from grape pomace and food by-products or waste
- Development and characterisation of phytonanoformulations from grape pomace and food by-products or waste

- *In vitro* and *in vivo* bioactivity of phytonanoformulations from grape pomace and food by-products or waste
- Technology transfer and entrepreneurship based on grape and other Mediterranean by-products.

The second conference took place in Cagliari (Italy), hosted by the University of Cagliari, on 27 September 2022. Both events end with a field visit to local wineries, associated partners of the project.

All information is available on the project social media Facebook and Instagram and on the project website https://www.enicbcmed.eu/projects/bestmedgrape.

## Week of events for the flora conservation in Cagliari at the end of September 2022

Alba Cuena-Lombraña[1,2], Ludovica Dessì[1,2], Francesca Meloni[1,2], Lina Podda[1,2], Marco Porceddu[1,2], Marco Sarigu[1,2], Gianluigi Bacchetta[1,2]

[1] Centre for the Conservation of Biodiversity (CCB), Department of Life and Environmental Sciences, University of Cagliari, Viale S. Ignazio da Laconi 11-13, 09123 Cagliari, Italy

[2] Sardinian Germplasm Bank (BG-SAR), Hortus Botanicus Karalitanus (HBK), University of Cagliari, Viale S. Ignazio da Laconi, 9-11, 09123 Cagliari, Italy

A series of events were held at the University of Cagliari, during the last week of September focusing on the conservation and valorisation of Mediterranean flora. The meeting with GENMEDA (Network of Mediterranean Plant Conservation Centres) and RIBES (Italian network for the ex-situ conservation of spontaneous Italian flora) partners allowed to share experiences, strengthen collaborations to developing common methodologies, applied technical and scientific know-how and information-sharing for the conservation of Mediterranean flora.

The week of events started with the BESTMEDGRAPE (New Business opportunities & Environmental suSTainability using MED GRAPE nanotechnological products) international conference, an ENI CBC MED project with partners from 6 different countries from the Mediterranean Basin, dedicated at valorising – grapes but also the expansion of the grape value chain through the development of nanotechnological products, thus boosting the local economy, reducing environmental pollution and increasing employment opportunities.

During the week, the first 25 years of activity of the Sardinian Germplasm Bank (BG-SAR) have been celebrated and a reflection was made on the past, present, and future of the seed bank. All BG-SAR's supporters and collaborators were thanked for their important support over these years.

The last three days of this full events week were dedicated to LIFE SEEDFORCE project (Using SEED banks to restore and reinFORCE the endangered native plants of Italy). This project is to improve the conservation status of 29 EU Habitats Directive Annex II species with an integrated *ex situ* and *in situ* approach, aiming at improving the quality of both habitats and populations in Natura 2000 network sites (SCI/SACs) where these species grow or have recently disappeared. Two-days standardisation workshop and a one-day field trip were included. The workshop was aimed at giving information on the best methods for the effective seed handling as planning a seed collection sampling, characterising, storing for long-term conservation and preparing the right seed mix for propagation. Practical activities at the Sardinian Germplasm Bank (BG-SAR) as germplasm collection activities, procedures from seed cleaning and selection to long-term conservation, morpho-colorimetric seed analysis, and seed germination experiments were carried out during the workshop.

During the last day of the workshop, the partners had the opportunity to participate in the European Researchers' Night hosted at the *Hortus Botanicus Karalitanus* (HBK) of the University of Cagliari.

A field trip to Molentargius-Saline Regional Natural Park and to the Monte Sant'Elia, Cala Mosca e Cala Fighera, two important Special Areas of Conservation of Sardinia, has been organized to close this week of events in the best mode possible, on the field!

Bird's eye view of the *Hortus Botanicus Karalitanus* (HBK) of the University of Cagliari

Participants at the BESTMEDGRAPE International Conference in Cagliari

Ceremony for the 25 years of activity of the Sardinian Germplasm Bank (BG-SAR)


Discussions on the conservation actions during the workshop of the LIFE SEEDFORCE project

Panoramic view of Cagliari and Molentargius-Saline Regional Natural Park

Start of the field trip to Molentargius-Saline Regional Natural Park

# THE NETWORK

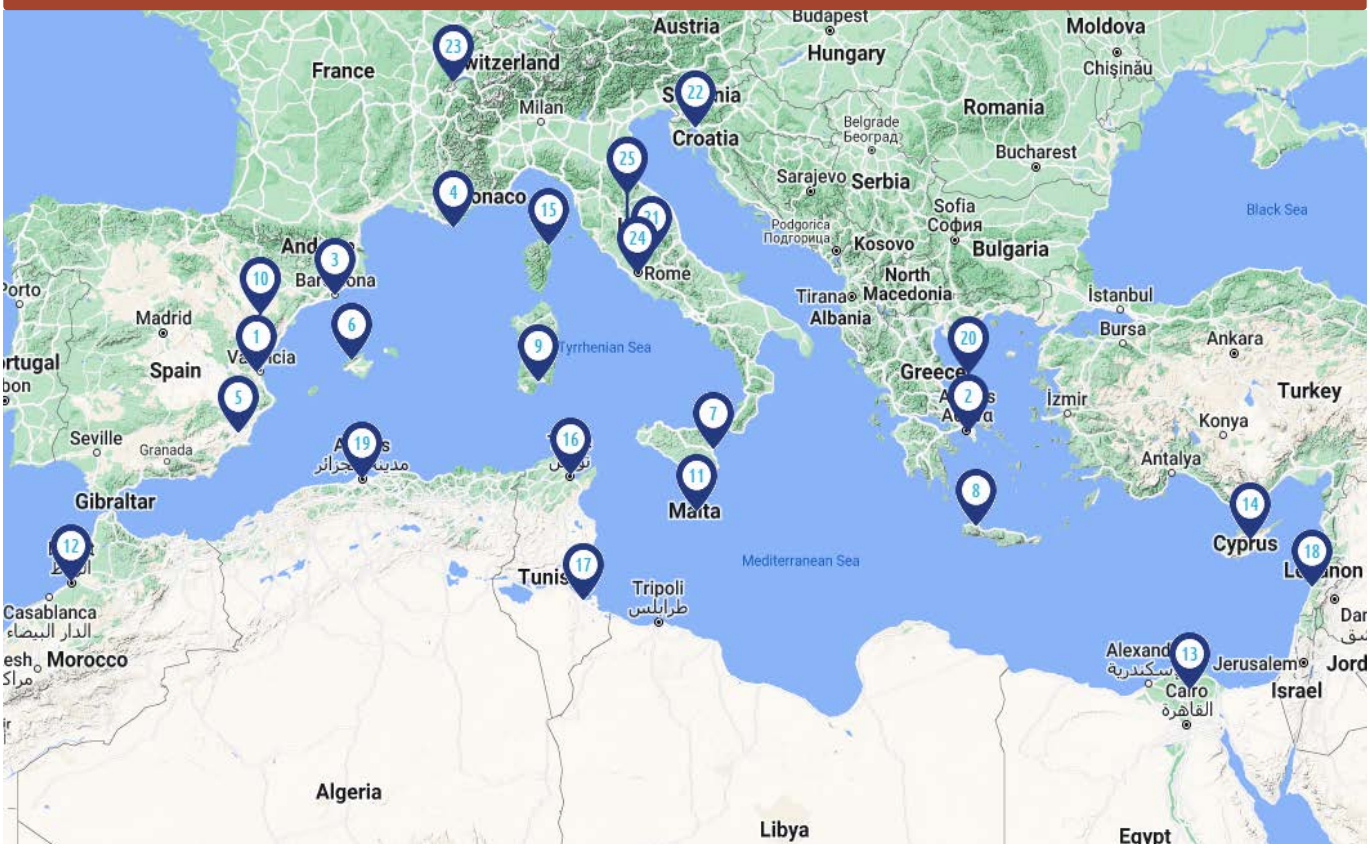
## Members*

1. Centre for Forestry Research and Experimentation (CIEF) of the Valencian Community, Spain
2. National and Kapodistrian University of Athens (NKUA), Greece
3. Institut Botànic - Jardí Botànic de Barcelona (JBB), Spain
4. Conservatoire Botanique National Méditerranéen of Porquerolles (CBNMed), France
5. Center of Conservation of Wild Flora of the Region of Murcia (CCFS), Spain
6. Fundació Jardí Botànic de Sòller (JBS), Spain
7. University of Catania - Department of Biological, Geological and Environmental Sciences (DBS), Italy
8. CIHEAM Mediterranean Agronomic Institute of Chania (MAICh), Greece
9. University of Cagliari - Hortus Botanicus Karalitanus (HBK), Italy
10. Botanic Garden of the University of Valencia (JBUV), Spain
11. Department of Biology, University of Malta (DBUM), Malta
12. Institut Scientifique de Rabat (ISR), Morocco
13. Mansoura University, Faculty of Science (FSUM), Egypt
14. Agricultural Research Institute (ARI), Cyprus
15. Office of the Environment of Corsica, Conservatoire Botanique National de Corse, France
16. National Research Institute for Rural Engineering, Water and Forests (INRGREF), Tunisia
17. Arid Zones Research Institute (IRA), Tunisia
18. Saint Joseph University (USJ), Laboratory for Seed Germination and Conservation and 'Jouzour Loubnan' Seed Bank, Lebanon
19. Hamma Botanical Garden (JEH), Algeria
20. Institute of Mediterranean & Forest Ecosystems-Hellenic Agricultural Organization "DEMETER" (FRIA), Greece
21. Rete italiana banche del germoplasma per la conservazione ex situ della flora spontanea italiana (RIBES), Italy
22. Natural History Museum Rijeka (NHMR), Croatia

## Associate members*

23. IUCN/SSC Mediterranean Plant Specialist Group (MPSG), Switzerland
24. Botanical Garden of Rome, Sapienza University of Rome (BGR), Italy
25. Tuscia Germplasm Bank , University of Tuscia (TGB), Italy

*Members and Associate members as in August 2022




# Representatives

**President:** Gianluigi BACCHETTA (HBK, Universita' degli Studi di Cagliari, Italy)

**Secretary/Treasurer:** Adamantia KOKKINAKI (CIHEAM MAICh, Greece)

**Steering Committee coordinator:** Emilio LAGUNA (Centre for Forest Applied Research, Valencia, Spain)

# Steering Committee members

Lara DIXON (Conservatoire Botanique National Méditerranéen de Porquerolles, France)

Sara MAGRINI (Rete Italiana Banche del Germoplasma - RIBES, Italy)

Joseph BUHAGIAR (Department of Biology, University of Malta)

Boštjan SURINA (Natural History Museum Rijeka, Croatia)

Evangelia DASKALAKOU (Institute of Mediterranean & Forest Ecosystems-Hellenic Agricultural Organization "DEMETER", Greece)

# Working Groups

**WG1 - Communication**: Adamantia KOKKINAKI (MAICh)/Lead, Bertrand DE MONTMOLLIN (IUCN/SSC/MPSG), Caroline FAVIER (CBNC), Francesca MELONI (HBK)

**WG2 - Database**: Lara DIXON (CBNMed)/Lead, Costantino BONOMI (RIBES), Caroline Favier (CBNC), Inmaculada FERRANDO (CIEF), Panagiota GOTSIOU (MAICh), Ali KHORCHANI (INRGREF), Angelos KYRATZIS (ARI), Chouaib MOUJAHDI (ISR), Marco PORCEDDU (HBK), Gianmarco TAVILLA (DBS)

**WG3 - Orchids and microbiota**: Sara MAGRINI (RIBES)/Lead, Fabio ATTORE (BGR), Vito Emanuele CAMBRIA (BGR), Jalal EL OUALIDI (ISR), Spyros OIKONOMIDIS (NKUA), Boštjan SURINA (NHMR), Magdalena VICENS (JBS)

**WG4 - Seed Force International**: Joseph BUHAGIAR (DBUM)/Lead, Mohamed ABDELAAL (FSUM), Miriam AIXART (JBB), Daniel ARIZPE (CIEF), Fabio ATTORE (BGR), Costantino BONOMI (RIBES), Vito Emanuele CAMBRIA (BGR), Antonia CRISTAUDO (DBS), Evangelia DASKALAKOU (FRIA), Jalal EL OUALIDI (ISR), Elena ESTRELLES (JBUV), Christini FOURNARAKI (MAICh), Laetitia HUGOT (CBNC), Abdelhamid KHALDI (INRGREF), Sara MAGRINI (RIBES), Faten MEZNI (INRGREF), Mohamed NEFFATI (IRA), Francisco Javier SÁNCHEZ-SAORÍN (CCFS), Boutheina STITI (INRGREF), Boštjan SURINA (NHMR), Issam TOUHAMI (INRGREF), Magdalena VICENS (JBS), Nassima YAHI (JEH)

# GENMEDA Members

CIEF
CENTRE PER A LA INVESTIGACIÓ I L'EXPERIMENTACIÓ FORESTAL

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National and Kapodistrian University of Athens
EST. 1837

Jardí Botànic de Barcelona

PORQUEROLLES

Región de Murcia
Consejería de Agricultura y Agua
Dirección General de Patrimonio Natural y Biodiversidad
Banco de Germoplasma de Flora Silvestre

Jardí Botànic de Sóller

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CORSE

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Faculté des sciences

Jardin Botanique du Hamma

HELLENIC MINISTRY OF RURAL DEVELOPMENT AND FOOD
HELLENIC AGRICULTURAL ORGANIZATION "DEMETER"

RIBES

# GENMEDA Associate Members

IUCN

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MUSEO ORTO BOTANICO
SAPIENZA
UNIVERSITÀ DI ROMA

Tuscia Germplasm Bank
University of Tuscia
(TGB)

Genmeda

NETWORK OF MEDITERRANEAN PLANT CONSERVATION CENTRES

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