



ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ

Εθνικόν και Καποδιστριακόν
Πανεπιστήμιον Αθηνών

ΙΔΡΥΘΕΝ ΤΟ 1837



HELECOS

12^ο

ΣΥΝΕΔΡΙΟ
ΕΛΛΗΝΙΚΗΣ

Οικολογικής
Εταιρείας

1-4

Οκτωβρίου
2025

Η επιστήμη της Οικολογίας
στην εποχή των προκλήσεων



Κεντρικό
Κτίριο του
Εθνικού &
Καποδιστριακού
Πανεπιστημίου
Αθηνών



Τράπεζα Σπερμάτων ΕΚΠΑ - Διατήρηση Φυτών και Οικολογική Έρευνα

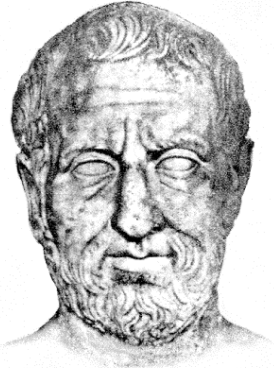
Κ. Θάνος, Κ. Κουτσοβούλου, Α. Καλτσής,
Σ. Οικονομίδης, Κ. Γεωργίου



WHAT IS A SEED BANK?

A seed bank is a facility that collects, stores, and preserves seeds (ex situ conservation) to long-term conserve plant genetic diversity for potential use in agriculture, research, or environmental restoration.

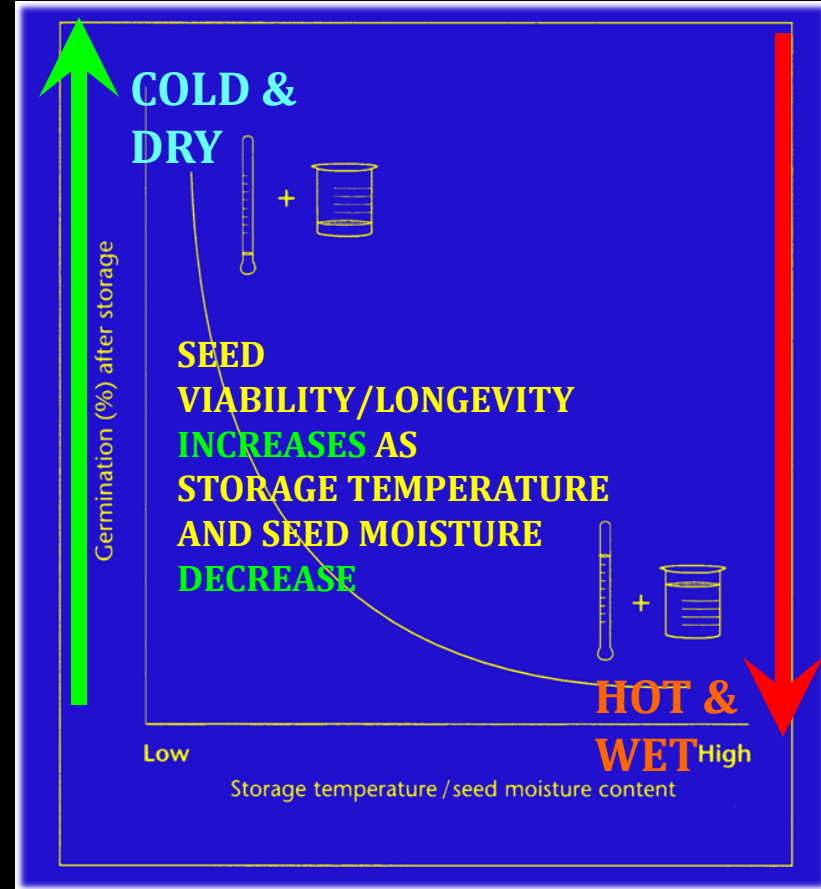
For maximum longevity, seeds (orthodox) should be dried at 5-8% water content and stored hermetically at -20 °C.



THEOPHRASTUS
371-287 BC

Last in all plants comes the seed. This possesses in itself moisture and heat, and if these vanish, the seeds become sterile, like eggs in a similar case.
(HP 1, 11, 1)

That region is elevated and always exposed to fair winds and breezes [cool and dry] ... They also say that in Media and other elevated countries, stored seeds persist for a long time.
(HP 8, 11, 6)



The first 3 Seed Banks



**1925 – Vavilov Inst.,
St Petersburg, Russia**



1943 – IPK, Gatersleben, Germany



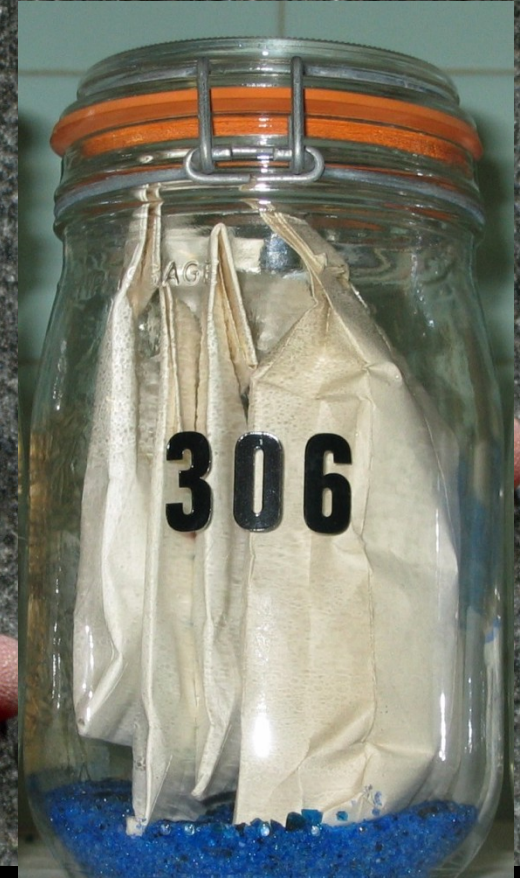
1958 – NSSL, Fort Collins, Co., USA

UPM Seed Bank (Madrid)

1966

The oldest Seed Bank
for wild plants

Flame-sealed glass vials or
hermetic "Kilner" jars with
dehydrated silica gel inside





1992



CONSERVATION OF BIODIVERSITY

In situ

&

Ex situ



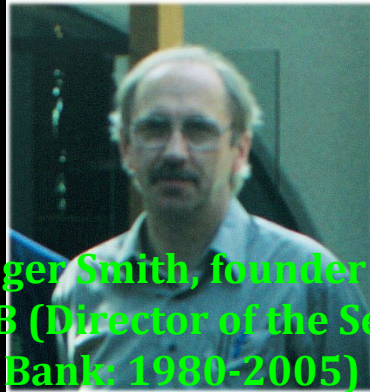


**Peter Thompson
(P.A. Thompson)
† Dec. 2008**

**Pioneer of
germination
ecophysiology
(& seed
banking)**

**P.A. Thompson has been in charge of Plant Physiology at Kew
RBG in the 60s-70s and founder of the Seed Unit and Seed
Bank, at Wakehurst Place, in 1980.**

Millennium Seed Bank (RGB Kew) – the largest Seed Bank of Wild Plants: >40,000 taxa



**Roger Smith, founder of
MSB (Director of the Seed
Bank: 1980-2005)**



**ca 1300 collections
(1000 taxa)**



Established 1991

Greece - taxa	813
Greece - endemics	213
Cyprus - taxa	76
Cyprus - endemics	49
MAICH duplicates	48



Est. 2010

<http://www.genmeda.net/>

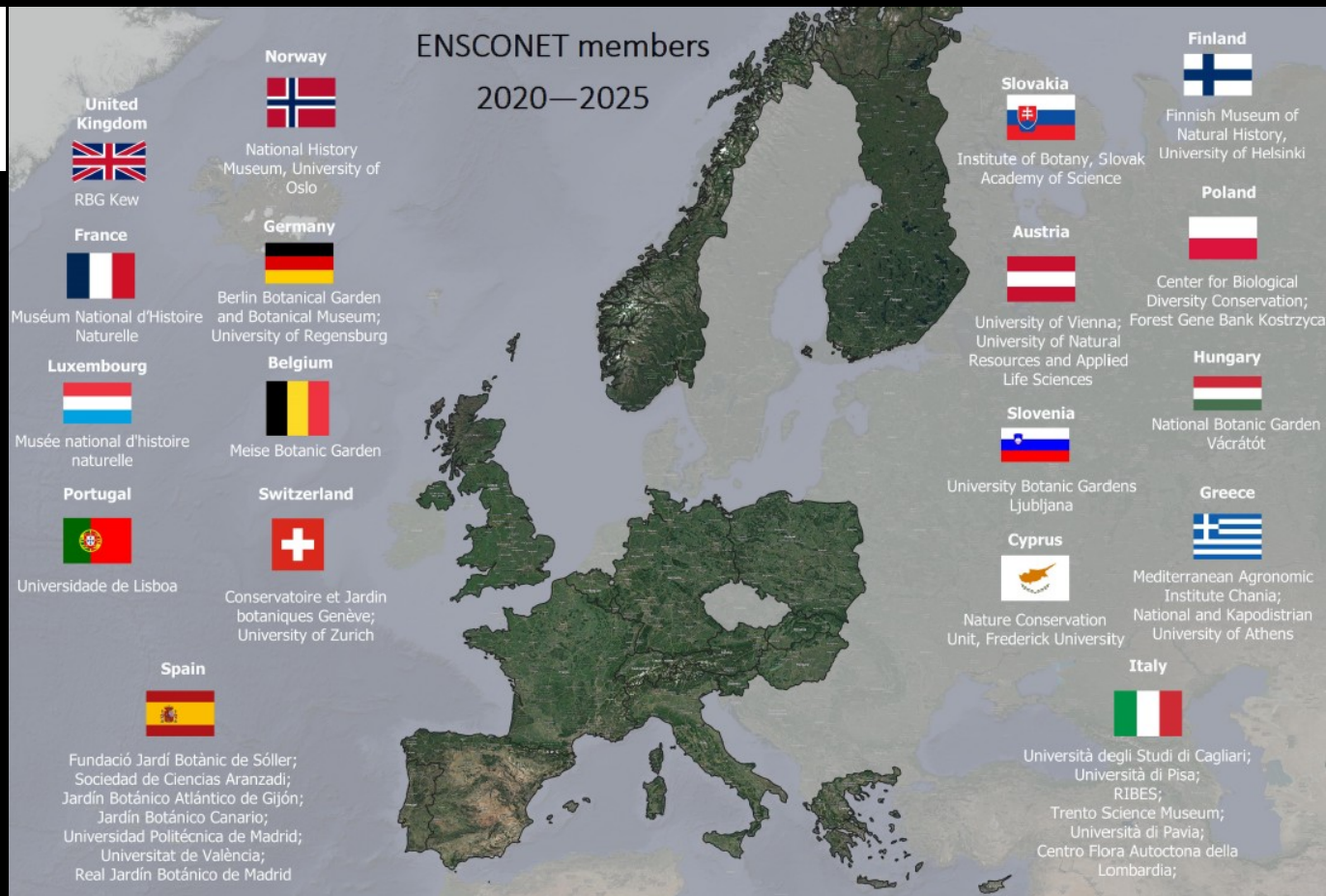
33 members



Est. 2010

**35 members in
2024**

**20 from the
Mediterranean
region**



Collection Guidelines



Collecting dry parts with seeds of *Campanula merxmülleri* (a Greek endemic) in cliffs of Skyros Isl., with the help of extending scissors. Bottom right: the same plant with flowers.

1. Pre-Collection Planning

- Select Target Species and Populations
- Obtain Permissions
- Assess Population Size

2. Timing and Seed Maturity

3. Sampling Strategy for Genetic Diversity

- Sample Size: Collect seeds from **at least 50 randomly selected individuals** per population, where possible, to capture genetic variation. For small populations, sample from as many individuals as feasible without exceeding 20% of available seeds.

- Spatial Sampling
- Multiple Populations

4. Collection Techniques

5. Seed Quantity

- Aim for **5,000–10,000 seeds** per accession to support long-term storage, viability testing, and potential use (e.g., restoration). For species with large seeds or low seed production, collect as many as feasible without harming the population.

- **Collect no more than 20% of available seeds** in a population to ensure natural regeneration is not compromised.

28.05.2024 10:56:34
ΑΚΡΙΒΕΣ ΑΝΤΙΓΡΑΦΟ
Ψηφιακά
ΥΠΟΓΕΓΡΑΜΜΕΝΟ
ΑΠΟ
Ιωάννης
Νικολακόπουλος



**ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΥΠΟΥΡΓΕΙΟ ΠΕΡΙΒΑΛΛΟΝΤΟΣ &
ΕΝΕΡΓΕΙΑΣ
ΓΕΝΙΚΗ ΓΡΑΜΜΑΤΕΙΑ ΔΑΣΩΝ
ΓΕΝΙΚΗ Δ/ΝΣΗ ΔΑΣΩΝ &
ΔΑΣΙΚΟΥ ΠΕΡΙΒΑΛΛΟΝΤΟΣ
Δ/ΝΣΗ ΠΡΟΣΤΑΣΙΑΣ ΔΑΣΩΝ
ΤΜΗΜΑ ΔΑΣΙΚΩΝ ΠΡΟΣΤΑΤΕΥΟΜΕΝΩΝ
ΠΕΡΙΟΧΩΝ & ΔΑΣΙΚΗΣ ΑΝΑΨΥΧΗΣ**

Ταχ. Δ/ση :Τέρμα Αλκμάνος, Ιλίσια
Ταχ. Κωδ. :115 28 ΑΘΗΝΑ
Πληροφ. :Θωμάς Αγγέλου
Τηλέφωνο :213 1512102
e-mail: t.aggelou@prv.ypeka.gr
prostasiadason@prv.ypeka.gr

ΘΕΜΑ: Άδεια έρευνας για χλωρίδα.

Collection
Permit

ΑΔΑ: 9ΞΕΔ4653Π8-3ΧΨ

Α. Π.: ΥΠΕΝ ΠΔΠΔ 756786/3949
Ως Προς την συμπερίληψη
Ημ/νίας: 28/05/2024
ΕΠΩΝΥΜΟΝ

- ΠΡΟΣ: 1.** Δρ **Κωνσταντίνος Α. Θάνος**,
Ομότιμος Καθηγητής Φυσιολογίας Φυτών,
Τμ. Βιολογίας, Ε.Κ.Π.Α.
e-mail: cthanos@biol.uoa.gr
- 2.** ΥΠΕΝ
Γενική Δ/ση Περιβαλλοντικής Πολιτικής
Διεύθυνση Διαχείρισης Φυσικού
Περιβάλλοντος και Βιοποικιλότητας

ΚΟΙΝ.: Πίνακας Κοινοποιήσεων

286	<i>Viola oligyrtia</i>	
287	<i>Viola phitosiana</i>	

Εξαιρούνται από την συλλογή τα παρακάτω είδη: *Gentiana cruciate*, *Gentiana lutea*.

ΤΡΟΠΟΣ ΠΡΑΓΜΑΤΟΠΟΙΗΣΗΣ ΤΗΣ ΕΡΕΥΝΑΣ

Στο πεδίο θα εντοπιστούν οι θέσεις όπου φύονται τα φυτά που αναγράφονται στον Πίνακα Α και εφ' όσον υπάρχει επαρκές απόθεμα θα συλλέγονται τα δείγματα (πρωτόκολλο ENSCONET). Αφού εντοπιστεί η κάθε περιοχή, θα γίνει η σήμανση (μαρκάρισμα) των φυτών στις θέσεις παρουσίας τους. Θα προσδιοριστεί και χαρτογραφηθεί ο υποπληθυσμός. Θα συλλεχθούν δείγματα για το ερμπάριο (φυτολόγιο) του Τμήματος Βιολογίας του ΕΚΠΑ.

ΠΕΔΙΟ ΕΡΕΥΝΑΣ

Αττική, Πελοπόννησος, Στερεά Ελλάδα, Εύβοια, Ήπειρος, Μακεδονία, Ιόνιοι Νήσοι, Κρήτη, Νησιά Αιγαίου (Περιφέρειες Αττικής, Πελοποννήσου, Δυτικής Ελλάδας, Στερεάς Ελλάδας, Θεσσαλίας, Ηπείρου, Ανατολικής Μακεδονίας και Θράκης, Δυτικής Μακεδονίας, Κεντρικής Μακεδονίας, Ιονίων Νήσων, Κρήτης Βορείου και Νοτίου Αιγαίου αντίστοιχα).

ΧΡΟΝΟΣ ΔΙΕΞΑΓΩΓΗΣ

Οι εργασίες πεδίου θα πραγματοποιηθούν μέχρι την **20η Δεκεμβρίου 2024**.

ΥΠΕΥΘΥΝΟΣ ΕΡΕΥΝΑΣ

Δρ Κωνσταντίνος Α. Θάνος, Ομότιμος Καθηγητής Φυσιολογίας Φυτών, Τμ. Βιολογίας,

ENSCONET

SEED COLLECTING MANUAL FOR WILD SPECIES

CURATION PROTOCOLS & RECOMMENDATIONS



ENSCONET ΕΓΧΕΙΡΙΔΙΟ ΣΥΛΛΟΓΗΣ ΣΠΕΡΜΑΤΩΝ ΓΙΑ ΑΥΤΟΦΥΗ ΕΙΔΗ

*Ελληνική έκδοση του
ENSCONET SEED COLLECTING MANUAL
FOR WILD SPECIES*

Κύριοι συντάκτες:
Royal Botanic Gardens, Kew (UK) &
Universidad Politécnica de Madrid (Spain)

Έκδοση 1: 17 Μαρτίου 2009*

* Αυτή η έκδοση θα επικαιροποιηθεί με τυχόν βελτιώσεις



ISBN:

Αναφορά: ENSCONET (2009) ENSCONET Εγχειρίδιο Συλλογής Σπερμάτων για Αυτοφυή Είδη



ENSCONET Curation Protocols & Recommendations

Overall editor:
Royal Botanic Gardens, Kew

Version: 15 June 2009



ISBN: 978-84-692-5964-1

Citation: ENSCONET (2009) ENSCONET Curation Protocols & Recommendations

NKUA SB SEED COLLECTION FORMS



SEED ACCESSION NUMBER

Collection Date (DD/MM/YYYY):		Principal Collector:	
Collection #:	Associate Collectors:		
Country: GREECE	Regional Unit:	Municipality:	
Locality, Geographic Entity:			
Datum: WGS84, DM	Latitude (N):	Longitude (E):	Altitude (m):
Taxon (G s - t):		subsp. var. f.	
Family:			
Habitat (VPG):	Life Form (VPG):	Wild (W) or Cultivated (C) Plants:	
Habitat Notes / Accomp. spp:			
Individuals collected:	Sampled population size (individuals):	Fructification stage (E, F, L):	
Collection plan, notes, details:	Estimate of seeds collected:		
Voucher collected?	Verification status (Y/N by whom):		
Verification (post collection), Y/N & specialist name:			
Collector notes and observations:			



ΑΡΙΘΜΟΣ ΣΠΟΡΟΜΕΡΙΔΑΣ

Ημερομηνία συλλογής (DD/MM/YYYY):		Συλλέκτης:	
Αριθμός συλλογής:	Βοηθοί συλλέκτες:		
Χώρα: ΕΛΛΑΣ	Περιφερειακή ενότητα:	Δήμος:	
Τοποθεσία, Οικισμός/Νήσος/Όρος:			
GIS: WGS84, DM	Πλάτος (B):	Μήκος (A):	Υψόμετρο (m):
Taxon (G s - t):		subsp. var. f.	
Οικογένεια:			
Οικότοπος (VPG):	Βιομορφή (VPG):	Από αγρία (W) ή καλλιεργούμενα (C) φυτά:	
Σημειώσεις για τον οικότοπο, συνοδά είδη κ.ά.:			
Άτομα που συλλέχθηκαν:	Μέγεθος πληθυσμού (άτομα):	Στάδιο καρπο- φορίας (E, F, L):	
Σχέδιο συλλογής και σημειώσεις σχετικά:	Εκτίμηση αριθμού σπερμάτων συλλογής:		
Δείγμα εργαστηρίου?	Αναγνώριση είδους, Y/N - όνομα:		
Αναγνώριση μετα-συλλεκτικά, Y/N & όνομα ειδικού:			
Σημειώσεις και παρατηρήσεις συλλεκτών:			

GENMEDOC

SEED GERMINATION METHODS IN THE GENMEDOC NETWORK SEED BANKS

Juin 2004 – Mai 2006



Pratiques de germination dans les banques de semences du réseau GENMEDOC

juin 2004 – mai 2006

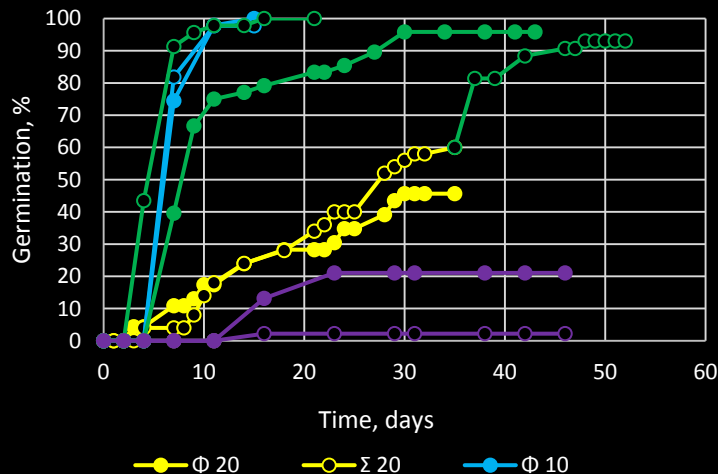


Μέθοδοι φύτευσης στις Τράπεζες Σπερμάτων του δικτύου GENMEDOC

Ιούνιος 2004 – Μάιος 2006



Germination Sheet of the NKUA Seed Bank



INSTITUTE OF GENERAL BOTANY / SEED RESEARCH UNIT

SEED GERMINATION TEST

Researcher: _____

Plant Material (species; cv or lot): *Conoclinium agreste*

Collection or harvest (place - month / year - source): _____

Seed weight: _____

Pretreatments: *4h lea m. Diapocyn 15 min FR + 15 min R*

Germination conditions: Petri dish *11* cm (diameter) / Other: _____

Substrate: *2* sheets of filter paper / Other: _____

Moistening agent: *25 ml d-H₂O* / Other: _____

Temperature: *15°C*

Incubator: Envirotron# _____ Heraeus# *J* Bench# _____ Other: _____

First/Final count: *1* days

Replications: *3* of *25* seeds

Start of germination in test conditions *20 21 22 23*

Light Conditions *D*

Measurement DATE	Test period (days)	Seeds germinated (cumulatively) in each replication								Mean (%) ± SE
1 <i>25.1</i>	<i>5</i>	0	0	1	0	0				0.8 ± 0.8
2 <i>27.1</i>	<i>7</i>	1	6	3	4	3				13.6 ± 3.2
3 <i>29.1</i>	<i>9</i>	14	19	16	17	14				64.0 ± 3.8
4 <i>1.2</i>	<i>12</i>	22	23	24	24	23				92.8 ± 0.5
5 <i>3.2</i>	<i>14</i>	23	23	24	24	23				93.6 ± 0.9
6 <i>5.2</i>	<i>16</i>	23	23	24	24	23				93.6 ± 0.9
7 <i>10.2</i>	<i>21</i>	23	23	24	25	23				94.4 ± 1.6
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
Empty seeds										
Dead seeds										
Ungerminated seeds										
Unimbibed seeds										

Comments: _____

Final m ± SE

Corrected for sound seeds

SIEVES



2.36 mm

1.40 mm

1.00 mm

900 μm

710 μm

630 μm

500 μm

400 μm

300 μm

250 μm

125 μm



**ASPIRATOR
(COLUMN BLOWER)**



**FREEZER
#3**



**DRYER/
INCUBATOR**



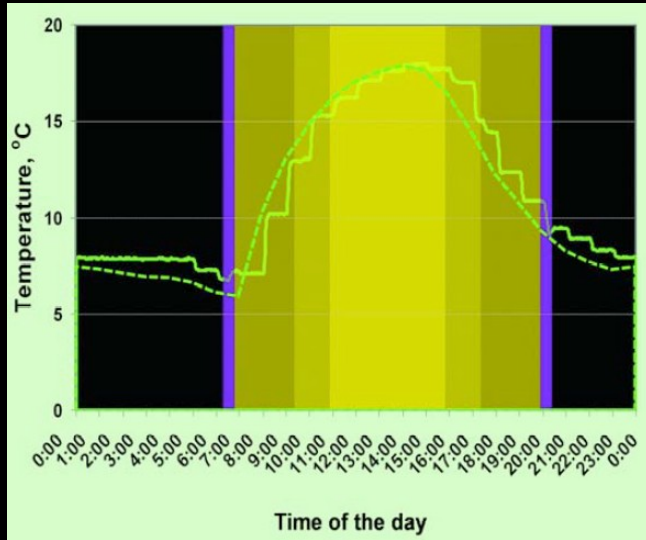
**DRYING ROOM
& CHAMBERS**



**GERMINATION
CHAMBER**

Seed germination research: from the traditional laboratory practice to an ecophysiological approach

Phytotronics in seed
germination



Microenvironmental
Sensors in the field



Greece contains one of the richest and most diverse floras in Europe and the Mediterranean Rim. Nearly 5,900 plant species and 7,000 taxa (species and subspecies) grow here, and around one quarter of them are endemic.

Threats to Greek phytodiversity are greater than ever, with land use changes (agriculture, urbanisation, tourism), overgrazing, deforestation, soil degradation and climate change affecting many parts of the country. The ongoing assessment of the conservation status of all Greek plants estimates that up to 2,000 taxa fall within an IUCN risk category. To combat impending biodiversity loss, numerous in situ and ex situ conservation initiatives are currently being undertaken.

It is estimated that only 30% of the Greek flora is currently conserved in the form of seed accessions, both in-country and abroad. In 2022, a collaborative project between the National and Kapodistrian University of Athens (NKUA) and the Millennium Seed Bank Partnership plans to collect, bank and conduct research on seeds of native plant species from mainland Greece. The NKUA Seed Bank was established in 1991 and is the oldest seed bank of native plants in Greece. Today, it holds 727 seed accessions from 403 plants native to Greece and Cyprus, most of them rare and threatened. In addition to ex situ conservation, the NKUA Seed Bank is also involved in several in situ conservation projects, conducts research on germination, and runs education and training events for students and staff related to various aspects of plant conservation.

In the first year, the project will aim to collect and conserve 160 taxa, focusing on key areas across Greece, such as Sterea Ellias (Central Greece) and the Peloponnese. These areas are well known for being some of the richest floristic regions in Greece for local and national endemics, alongside Crete. However, in contrast to Crete, they are both relatively under-represented within seed bank collections. We will prioritise species based on their threatened status and/or those missing from existing ex situ collections (e.g. *Veronica oetaea*). In addition to seed collecting, the project also aims to increase overall capacity of seed conservation through the delivery of an in-country training course in 2022. Finally, the project will initiate research on seed germination ecophysiology of orchids found within the country. The project is graciously funded by the A. G. Leventis Foundation, players of People's Postcode Lottery and The Steel Charitable Trust.



Collecting seeds of *Campanula marmariorum*, a vulnerable, strict endemic chasmophyte of the Aegean (July, Skyros Island); bottom right: the plant in flower (late May).



Seeds of *Biebersteinia orphandis*; the inset (top left) shows a just-germinated seed after its seed coat was nicked at the region opposite to the micropyle. Previously thought to be extinct in Greece, this plant was rediscovered in the 1990s and is currently threatened by grazing and land-clearing.



Reseeding *Veronica oetaea*, a critically endangered annual, growing only in a few temporary ponds on Mount Delta (Central Greece).

Samara

The International Newsletter of the Millennium Seed Bank Partnership

December 2021 Issue 27

ISSN 1475-8245



MILLENNIUM
SEED BANK
PARTNERSHIP

Feb. 2022 - Jun. 2025

Conserving the Flora of Balkans: Native Plants of Greece

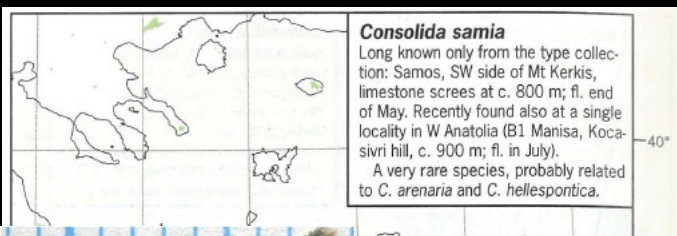
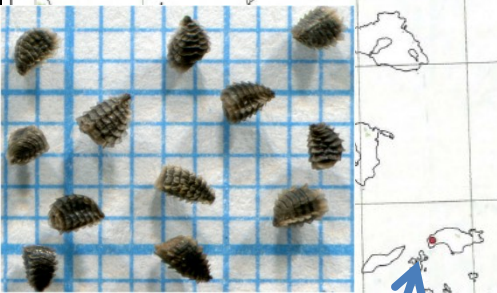
580 seed
collections

A Project in
collaboration with RBG
Kew

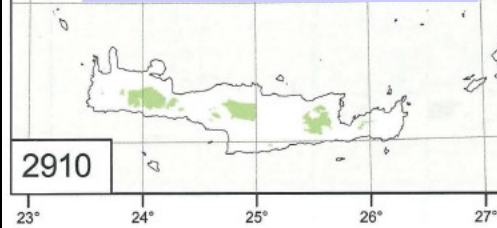
FUNDED by:

- The A.G. Leventis Foundation
- Players of People's Postcode Lottery
- Linde
- The Steel Charitable Trust
- Navarino

Quest to rediscover *Consolida samia* - exploring the screes of Mt Kerketefs (Samos, Greece) (MBZ foundation & MSBP PROJECT)



Photographed for the first time, 61 years after its initial (1962) herbarium sample (type) collection!



IUCN	CR
GR ENDEMIC	YES
92/43/EEC	YES
BERN	YES
PRES. DEC.	YES
TOP50	YES

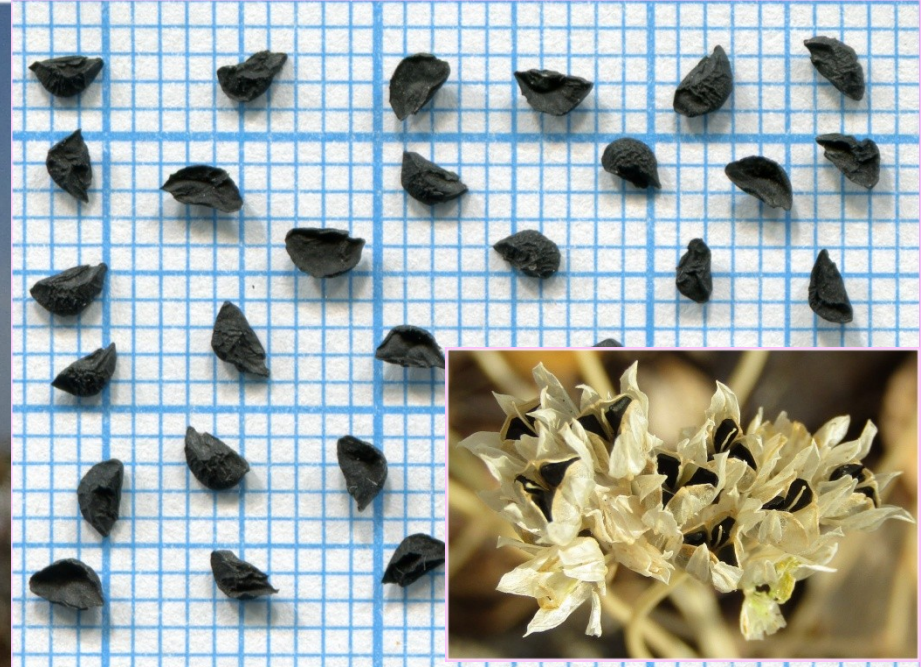
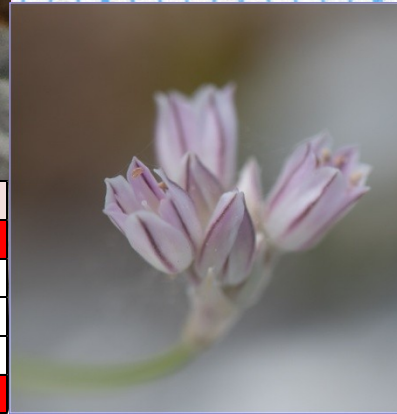


Allium calamarophilon

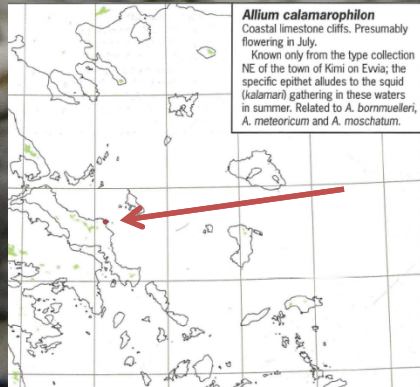
LOST SINCE 1980



Allium calamarophilon
Coastal limestone cliffs. Presumably
flowering in July.
Known only from the type collection
NE of the town of Kimi on Evvia; the
specific epithet alludes to the squid
(*kalamar*) gathering in these waters
in summer. Related to *A. bornmuelleri*,
A. meteoricum and *A. moschatum*.



IUCN	DD
GR ENDEMIC	YES
92/43/EEC	
BERN	
PRES. DEC.	
TOP50	YES



Paeonia clusii subsp. *rhodia*

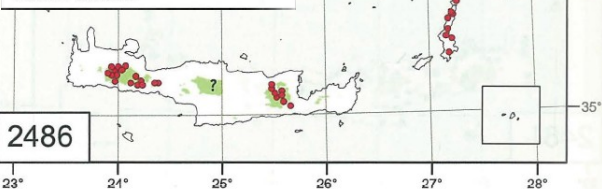


Paeonia clusii

- subsp. *clusii*
- subsp. *rhodia*

Rocky places, usually in open coniferous woodland, occasionally in garigue or dolines, 200-1600 m. Fl. April-May.

Endemic to the mapping area; probably related to *P. broteri* from the Iberian Peninsula.



2486

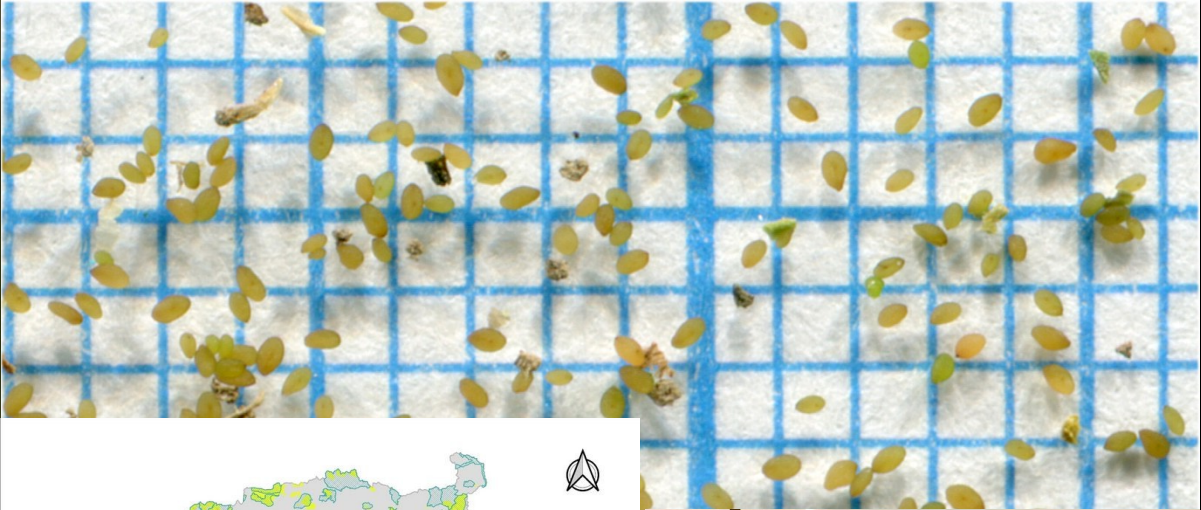
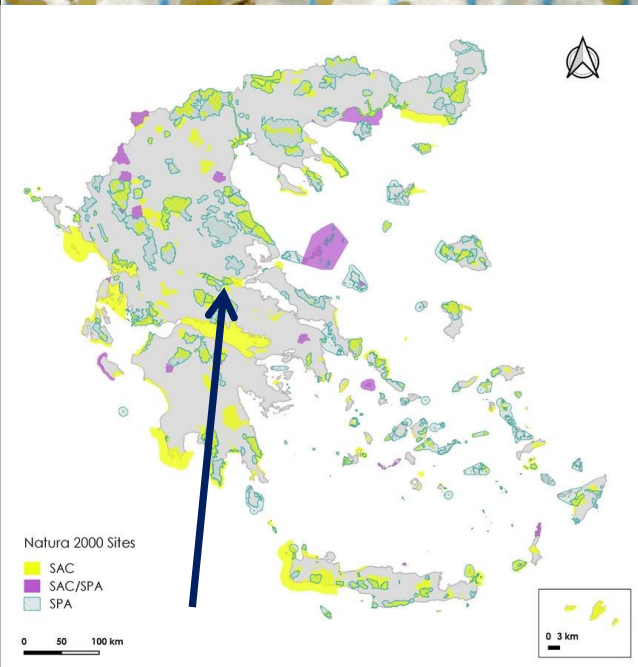
IUCN	VU
GR ENDEMIC	YES
92/43/EEC	YES
BERN	YES
PRES. DEC.	YES
TOP50	





Veronica oetaea

IUCN	CR
GR ENDEMIC	YES
92/43/EEC	YES
BERN	YES
PRES. DEC.	
TOP50	



Seed Ecology VI
July 29 - August 2 2019
Regensburg, Germany



The ecology of seed mass across the entire Flora of Greece

**Thanos C.A.^{1*}, Daskalaku E.², Koutsovoulou K.^{1,3}, Doussi M.A.¹,
Kaltsis A.¹, Oikonomidis S.¹, Markaki E.⁴, Fournaraki C.⁴**

¹ Department of Botany, Faculty of Biology, National and Kapodistrian University of Athens,
Greece cthanos@biol.uoa.gr

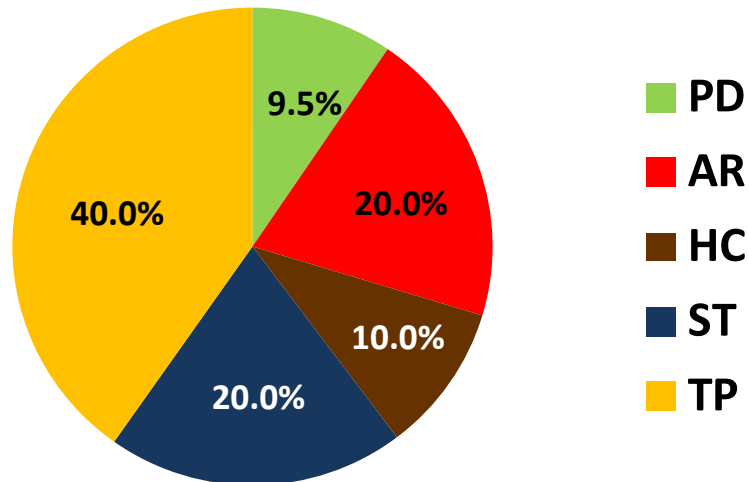
² Institute of Mediterranean Forest Ecosystems, Hellenic Agricultural Organization "DEMETER",
Athens, Greece

³ Green Fund, Athens, Greece

⁴ Mediterranean Plant Conservation Unit, Mediterranean Agronomic Institute of Chania (MAICH),
Chania, Greece

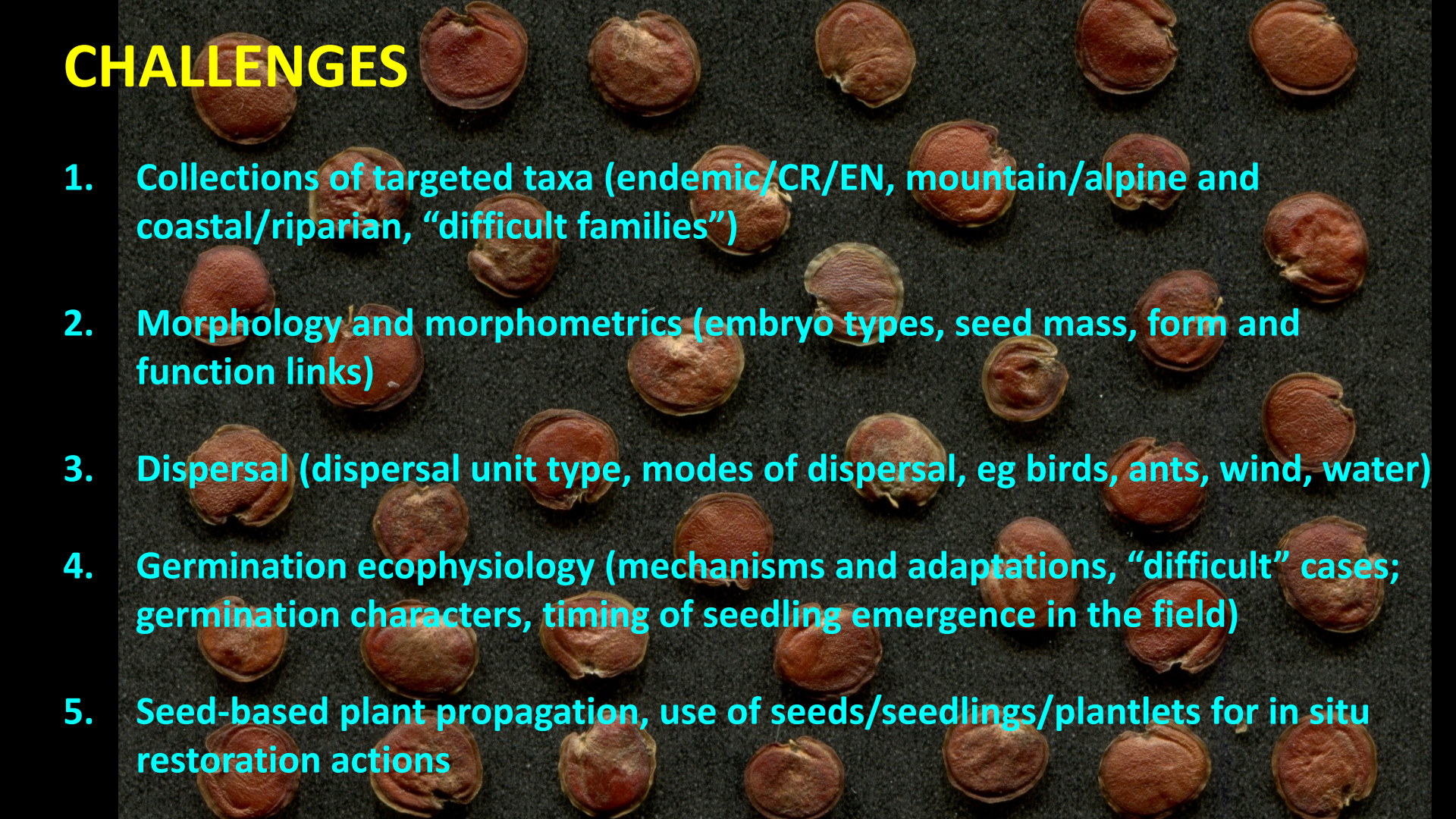


Germination functional types in the spermatophytes of Greece

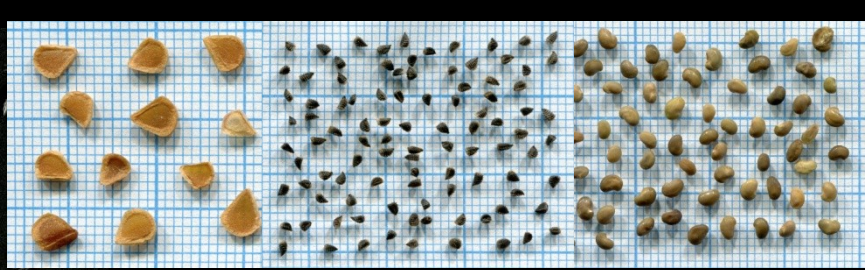
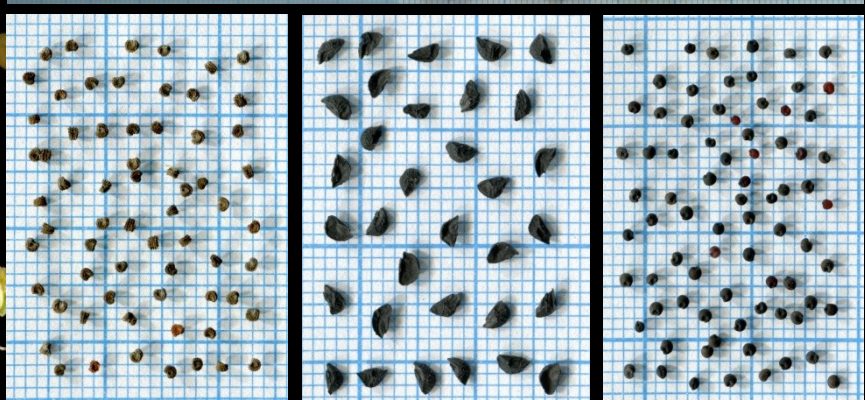


5 Germination Types
IN GREECE / PROJECTION

CHALLENGES

The background of the slide is a dark, textured surface covered with numerous reddish-brown seeds. The seeds are of various shapes, mostly oval or rounded, and some show signs of being cracked or broken open, revealing a lighter interior. They are scattered across the entire frame, creating a dense, naturalistic pattern.

1. Collections of targeted taxa (endemic/CR/EN, mountain/alpine and coastal/riparian, “difficult families”)
2. Morphology and morphometrics (embryo types, seed mass, form and function links)
3. Dispersal (dispersal unit type, modes of dispersal, eg birds, ants, wind, water)
4. Germination ecophysiology (mechanisms and adaptations, “difficult” cases; germination characters, timing of seedling emergence in the field)
5. Seed-based plant propagation, use of seeds/seedlings/plantlets for in situ restoration actions



Ο βίος βραχύς, η δε τέχνη μακρή





THANK YOU!!