HYBRID PARKS

ΠΕΡΙΦΕΡΕΙΑ ΝΟΤΙΟΥ ΑΙΓΑΙΟΥ

Combining abilities, creating synergies and enhancing the performance of parks for sustainable development policies

INTERREG IVC

Διεθνές Συνέδριο

«Χώροι Πρασίνου: Ένας μοχλός για βιώσιμη τοπι ! αν "πτυ#η$

26/6/2014, Ξενοδοχείο RODOS PALACE, Ρόδος




HYBRID PARKS

ΠΡΟΣΚΛΗΣΗ

Η Περιφέρεια Νοτίου Αιγαίου και το Περιφερειακό Φυτώριο Νοτίου Αιγαίου Α.Ε.

σας προσκαλούν στο συνέδριο με θέμα:

«Χώροι Πρασίνου: Ένας μοχλός για βιώσιμη τοπική ανάπτυξη»

η αξιοποίηση των δυνατοτήτων και των ευκαιριών που προσφέρουν οι χώροι πρασίνου
για την επίτευξη οικονομικών, κοινωνικών και περιβαλλοντικών οφελών,
τόσο σε τοπικό, όσο και σε περιφερειακό επίπεδο

Για την Περιφέρεια Νοτίου Αιγαίου,

Φώτης Χατζηδιάκος
Αντιπεριφερειάρχης Δωδεκανήσου

Συγχρηματοδοτούμενο έργο από

European Union

INTERREG IVC

Διοργάνωση:
Περιφέρεια Νοτίου Αιγαίου – Περιφερειακή Ενότητα Ρόδου

ΠΕΡΙΦΕΡΕΙΑ ΝΟΤΙΟΥ ΑΙΓΑΙΟΥ

Βιώσιμη εκμετάλλευση των αυτοφυών φυτών: η στρατηγική του Βαλκανικού Βοτανικού Κήπου Κρουσσίων στη Βόρεια Ελλάδα

Δρ Νίκος Κρίγκας

Τομέας Βοτανικής & Τομέας Οικολογίας,
Τμήμα Βιολογίας, Αριστοτέλειο ανεπιστήμιο ! εσσαλονίκης
nkrigas@bio.auth.gr
" πιστημονικός #υνεργατης BB$$

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ΠΕΡΙΦΕΡΕΙΑ ΝΟΤΙΟΥ ΑΙΓΑΙΟΥ

Sustainable exploitation of wild growing plants: the strategy of the Balkan Botanic Garden of Kroussia, N Greece

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Scientific Collaborator of the BBGK

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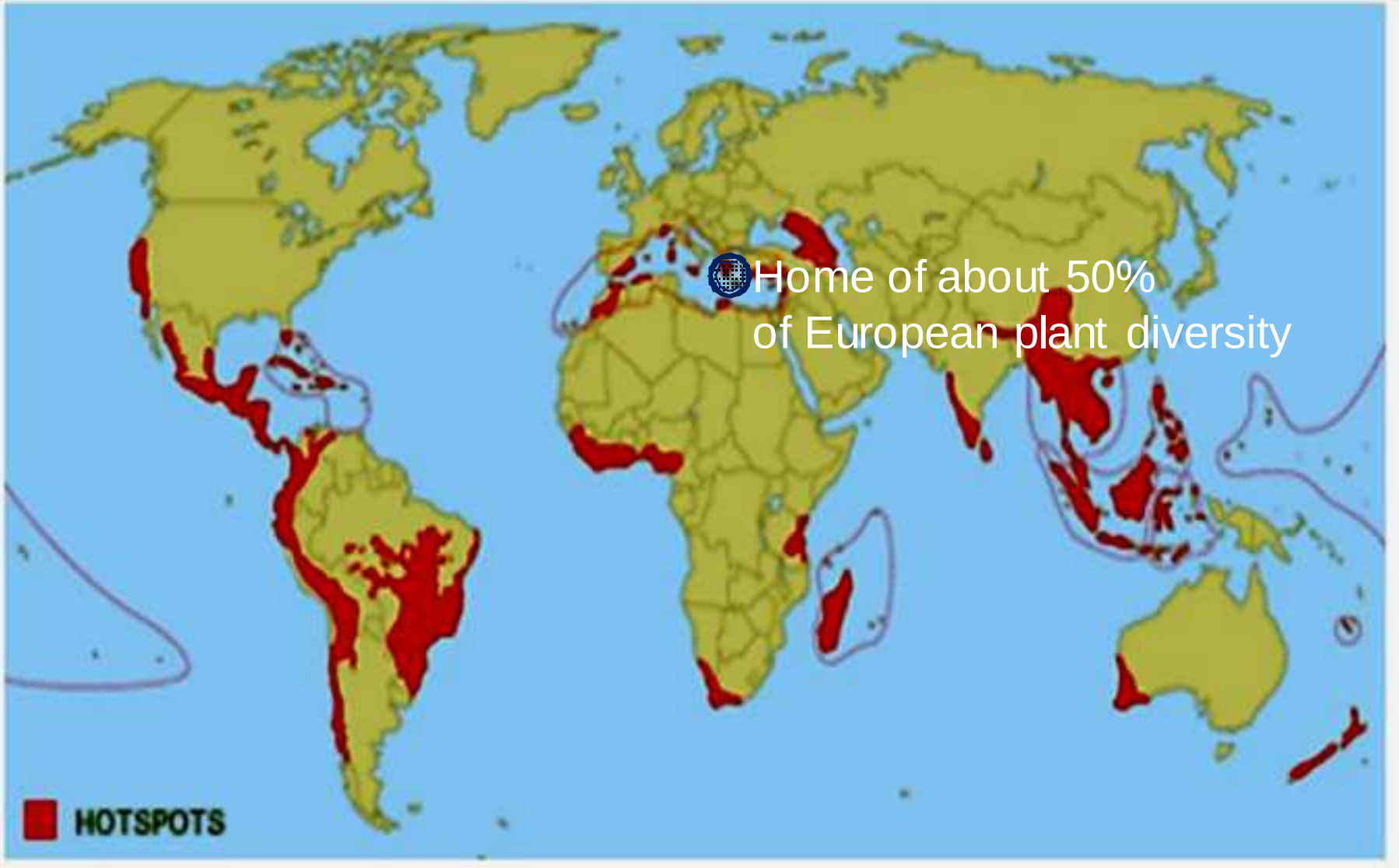
ΠΕΡΙΦΕΡΕΙΑ ΝΟΤΙΟΥ ΑΙΓΑΙΟΥ

OVERVIEW

Plant diversity and uniqueness in Greece
Conventional and sustainable exploitation of wild plants
Introducing the Balkan Botanic Garden of Kroussia (BBGK)
Why BBGK is different as a botanic garden?
Strategic policies of BBGK
BBGK promotes the sustainable exploitation of wild plants
Why a botanic garden in Rhodes? The first steps…

Plant diversity is not equally distributed in our world

There are 33 global biodiversity hotspots



Plant diversity in Greece

13 regions
each with
1,640 to 3,130
plant taxa
(species & subspecies)

4 European Centres
of Plant Diversity
& Endemism

Rhodes: 55% of the East Aegean Islands flora

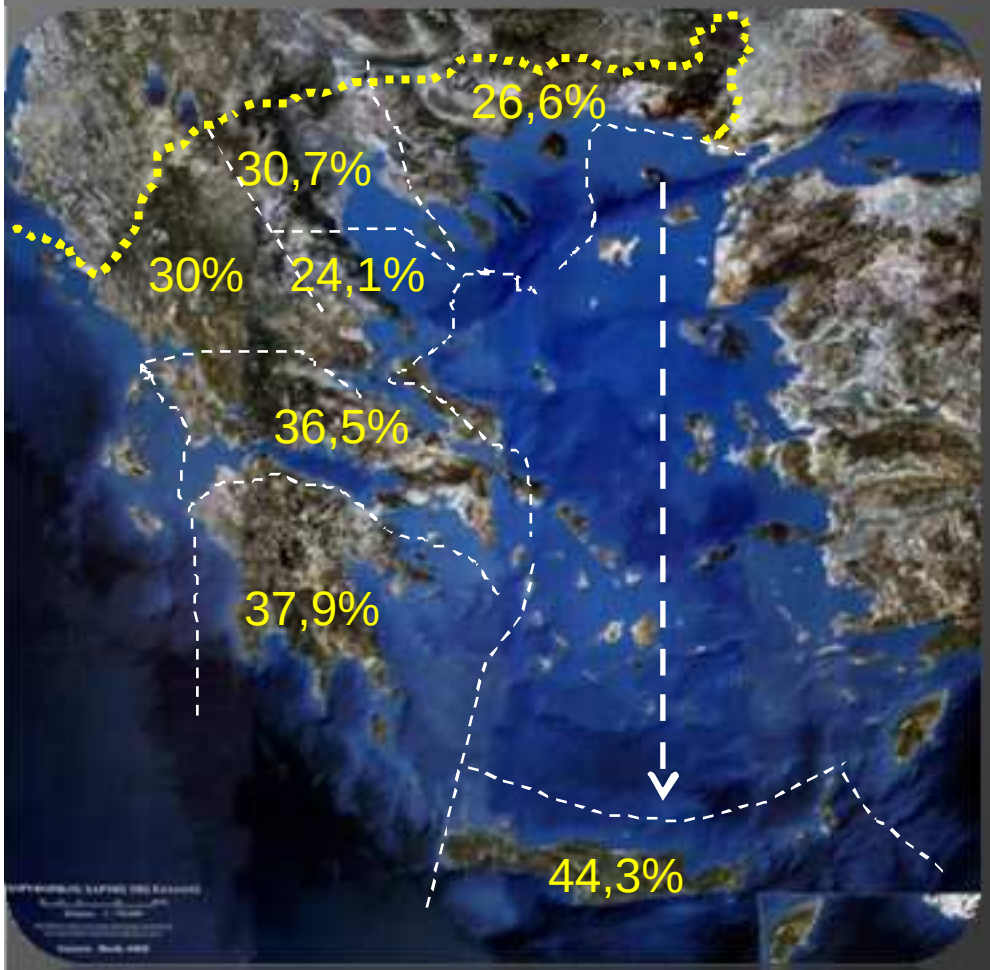
Note: In every small region plant richness is high

Greece has an exceptionally rich flora

>6,600 taxa
(species and subspecies)

High percentage of unique ele ents (ca! "0# ende ics, 1,%00 taxa)

Plant uniqueness in Greece



The richest flora in Europe in relation to surface

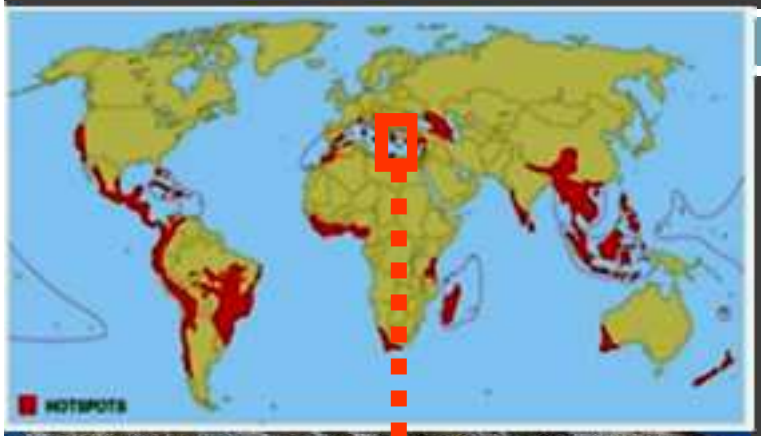
High endemism (uniqueness):

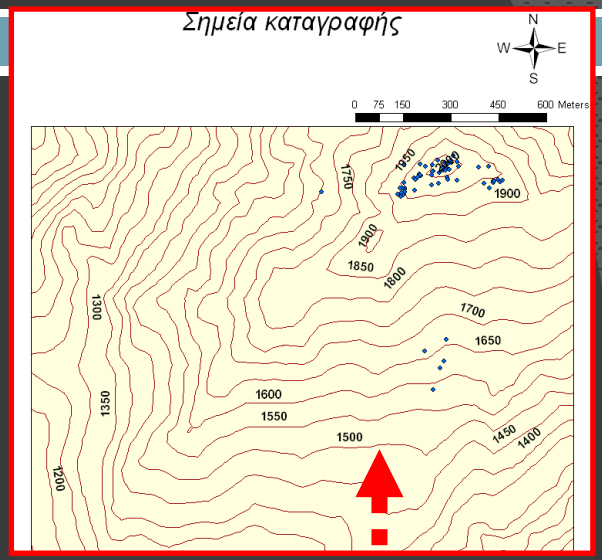
Mountain endemics,
Island endemics,
Regional endemics,
Greek endemics,
Aegean endemics,
Balkan endemics

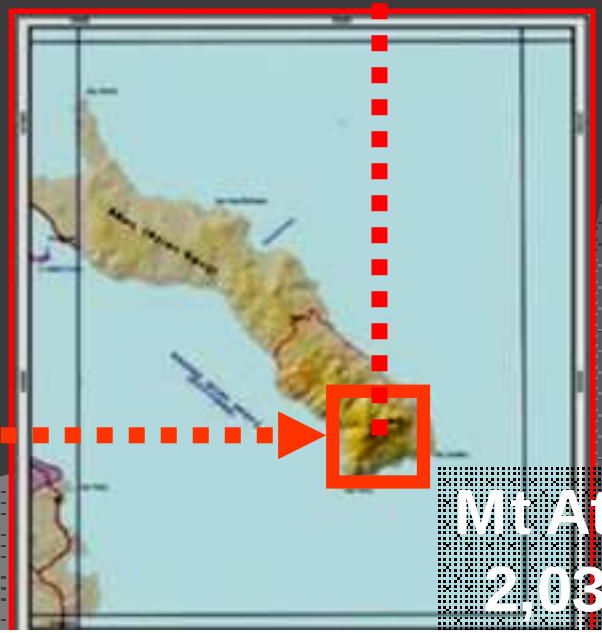
Note: From North to South, the endemism is increased.

Rare local endemic plants of Greece:

Globally threatened plants







Mt Athos
2,033m


Photo: A. Karydas
Silene orphanidis
Annex II
EU Directive 92/43/EEC
Single-mountain endemic
Vulnerable: Red Data Book
Endangered: IUCN Red Lists
Endangered: European Red List
Endangered: EU Council
Corine
Bern 92
Presidential Decree 67/81

Helichrysum sibthorpii: Single-mountain endemic

Vulnerable: Red Data Book
Vulnerable: IUCN Red Lists
Vulnerable: European Red List
Vulnerable: EU Council
Corine
Bern 92
Presidential Decree 67/81

&hat does it ean to exploit wild plants in a sustainable way’

The sustainable exploitation of wild plants would ensure that they would meet the needs of the present generation as well as the needs of future generations.

But how do we do this?

(he conventional, unsustainable way of plant exploitation) !

Rising demand for natural products in developed countries, put pressure on the ecosystems of the developing countries (from where the bulk of the raw material is derived).

The medicinal plants are collected from the wild by the local people who have the knowledge of their occurrence and may access them.

(he conventional, unsustainable way of plant exploitation) !

They sell the plants to the traders at throwaway prices.
The money they get in return barely sustains them for a few days or weeks.

As a result the local economies of these regions remain poor and underdeveloped.

The plant populations are threatened with extinction.

How do we exploit wild growing plants in a sustainable way?

Axis1: Review of current knowledge, selection of target-areas and target-species, documentation

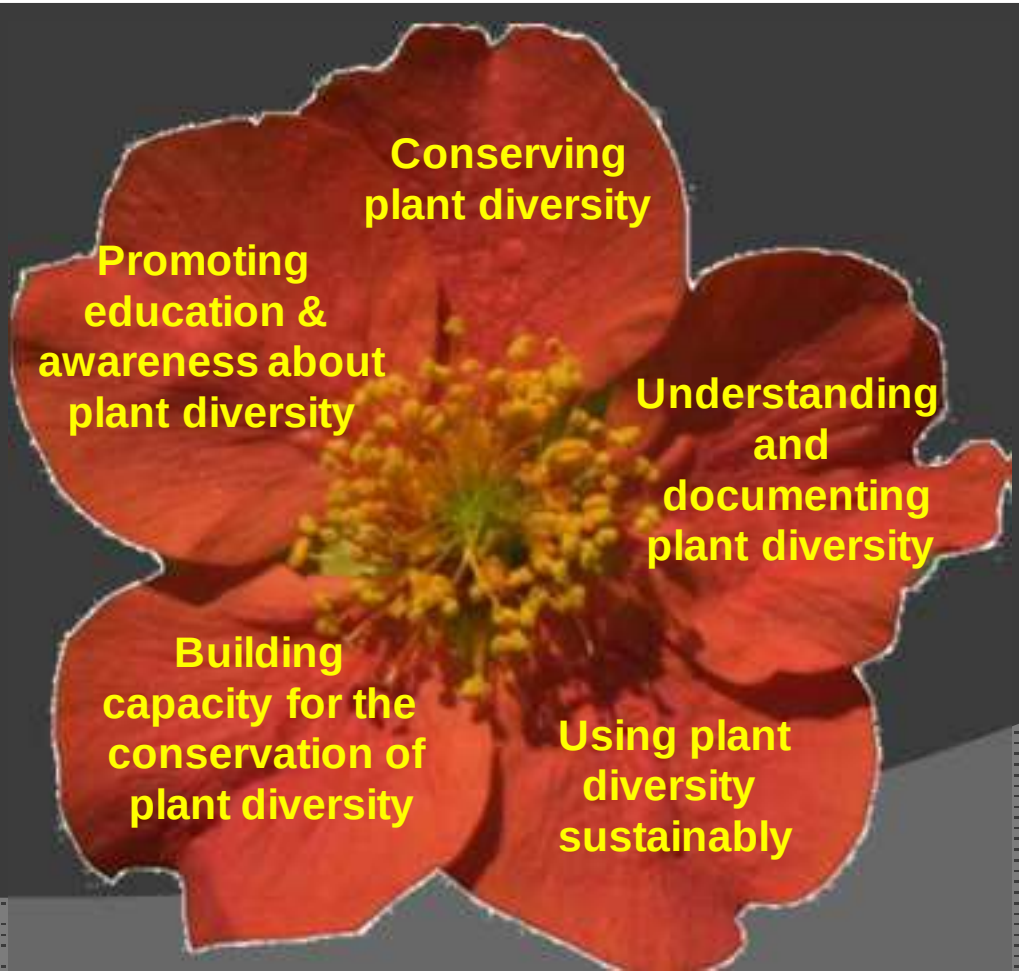
Axis 2: Expedition (collection permit), localization, acquisition & transfer of plant material, documentation

Axis 3: Development of infrastructure and know-how, cultivation-propagation-conservation protocols

A procedure with several steps…

Global Strategy for Plant Conservation

5 scopes & 16 major targets to be achieved



Mission of the Balkan Botanic Garden Kroussia in Greece

A major priority is to

to the integrated conservation & management of the threatened and medicinal-aromatic plants or other major socio-economically valuable species.

To achieve this target

BBGK suggested and achieved join forces with

- Greek botanic gardens
- Greek universities
- National research institutes
- Private companies

in applied research programs financed by different sources

Balkan Botanic Garden of Kroussia

Established: 2001

Location: Mt Kroussia, N Greece

...at a distance 70 $m away from Thessaloniki (second biggest Greek city)

Entrance

Entrance

Balkan Botanic Garden of Kroussia

Area: 31ha

Altitude: 600m

Natural deciduous oak forest:
Quercus frainetto & *Q. pubescens*

Dedicated to the *in situ* and *ex situ* conservation

Only native plants of Greece and the Balkans are displayed

Balkan Botanic Garden of Kroussia

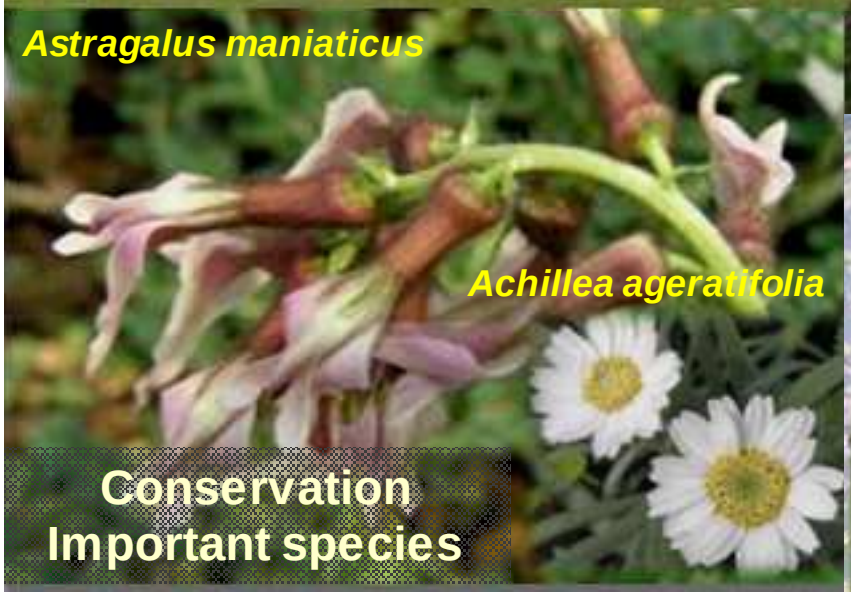
The Garden of the Senses

Balkan Botanic Garden of Kroussia

The Garden of the Senses

Balkan Botanic Garden of Kroussia

Main Garden



In situ orchid conservation section

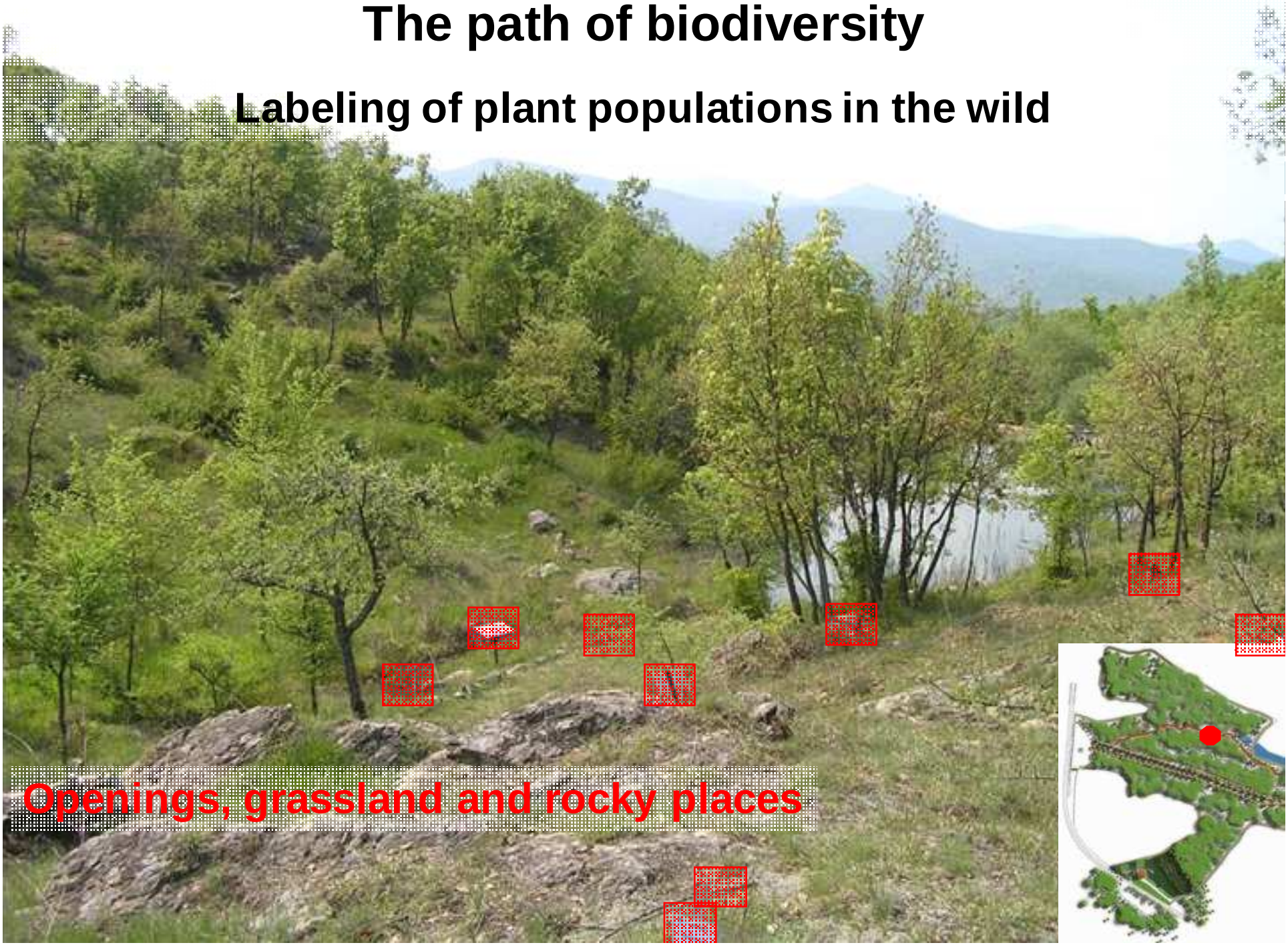

BBGK provides habitat for populations of at least 10 orchid species

Balkan Botanic Garden of Kroussia

Visitors throughout the year

The path of biodiversity

Labeling of plant populations in the wild




The path of biodiversity
Regional Greek endemic
Caryophyllaceae
Dianthus corymbosus
Sm. in Sibth & Sm.
Labeling of plant populations in the wild

What is so different in this botanic garden?

The strategy of the Balkan Botanic Garden of Kroussia

A set of 7 policies:

1: Only native plant species

2: Conservation Important Plant Species (CIPS), first (endemics, rare, threatened, vulnerable, protected species, plants with potential ornamental value and/or aromatic-medicinal properties)

3: Explicit plant documentation

4: Propagation of the CIPS first (protocols, re-introduction in the wild)

5: Combined *in situ* and *ex situ* plant conservation actions

6: Environmental awareness on native plant diversity

7: Sustainable exploitation of phytogenetic resources

From: Krigas & Maloupa (2008). *The Balkan Botanic Garden of Kroussia, Northern Greece: a garden dedicated to the conservation of native plants of Greece and the Balkans (invited botanic garden profile).* – Sibbaldia 6: 9-27.

*ustainable exploitation+ , nce identified, the wild plants are not harvested

Localization and identification of target-species in the wild

*ustainable exploitation+ only a s all fraction of the plant population is collected with caution

Selection of suitable propagation material

*ustainable exploitation+ only a s all fraction of the plant population is collected with caution

Selection of suitable propagation material

*ustainable exploitation‡ only well-docu ented propagation aterial is collected for research reasons

Documentation and transport of the wild plant material collected

*ustainable exploitation+ ai ing to cultivate (do esticate) the wild plant aterial)

Maintenance of the documented mother plants in BBGK

Special nurseries, Thessaloniki area, N Greece, sea level

*ustainable exploitation+ ai ing to cultivate (do esticate) the wild plant aterial)

Maintenance of the documented mother plants in BBGK

Mother plantations, Thessaloniki area, N Greece, sea level

Wild growing plants:

Originate from a variety of different habitats and are adapted to different environmental conditions.

Very difficult to emulate their preferable conditions.

Do not always respond to typical cultivation methods.

A deeper understanding of their ecology and life cycle is the key to their successful propagation, cultivation and sustainable exploitation.

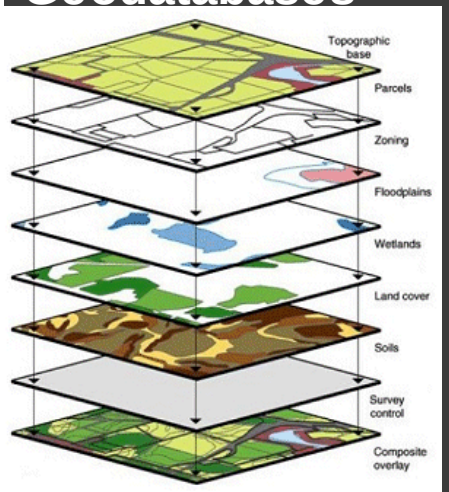
A challenge….

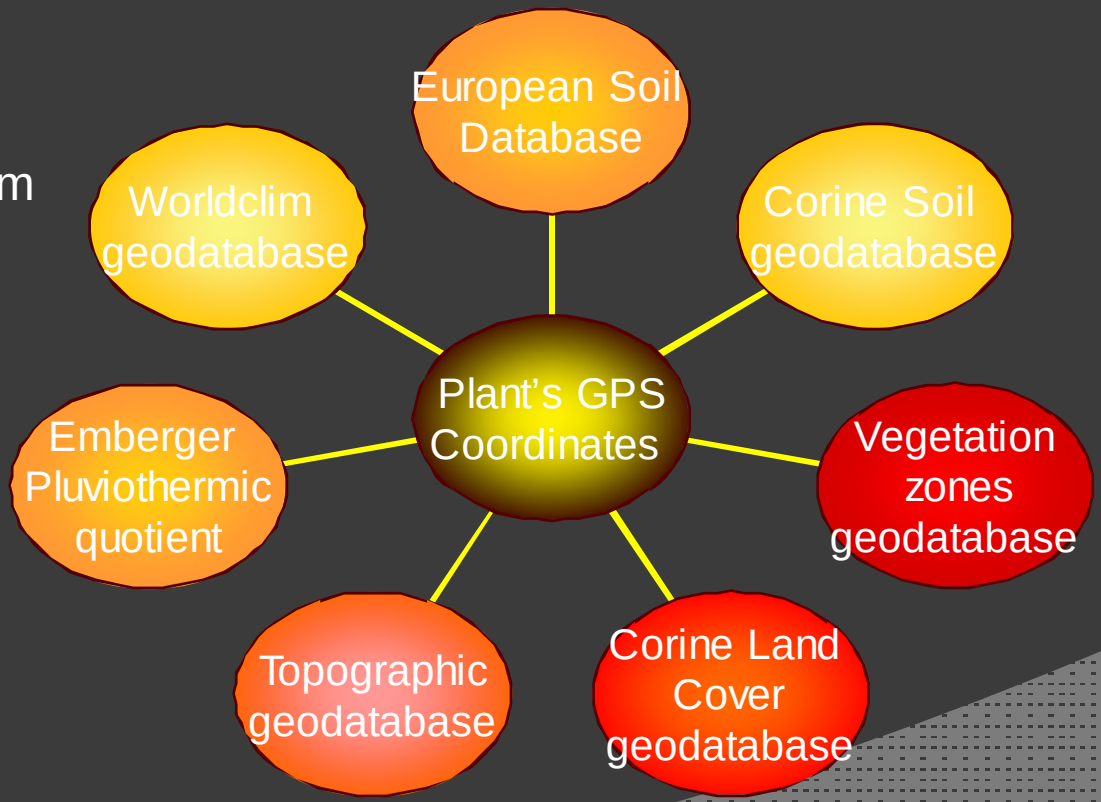
*ustainable exploitation+ to achieve successful cultivation, the natural environ ent ust be e ulated (best possible)

Emulation of the natural environment in BBGK using GIS

Global **P**ositioning **S**ystem

Geodatabases



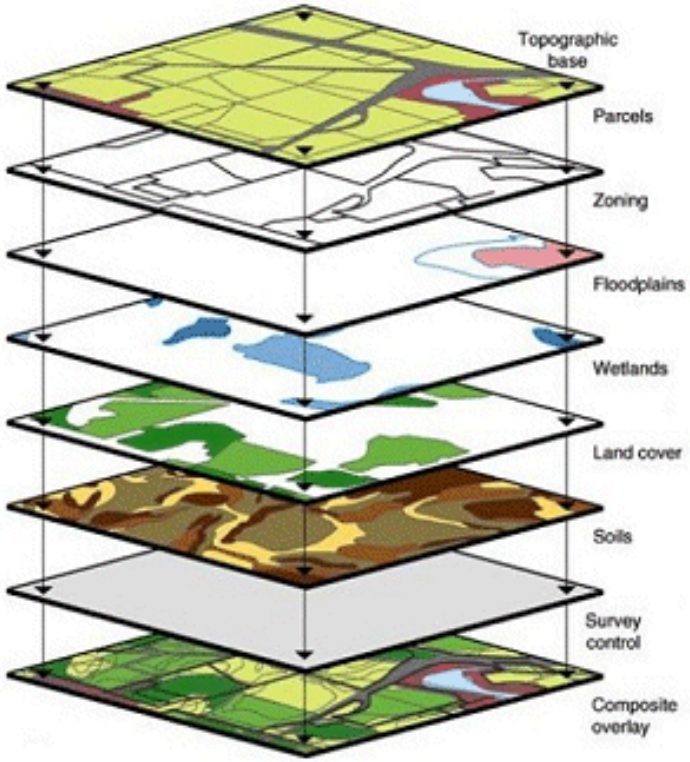


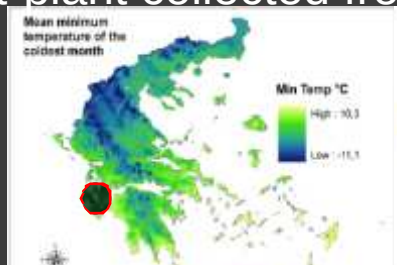
From: Krigas N., Mouflis G., Grigoriadou K. & Maloupa E. (2010), *Conservation of important plants from the Ionian Islands at the Balkan Botanic Garden of Kroussia, N Greece: using GIS to link the in situ collection data with plant propagation and ex situ cultivation.* – Biodiversity and

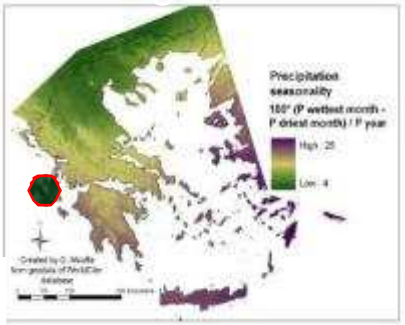
Thematic layers in GIS (Geographic Information System), are used to describe the ecological profiles of plants

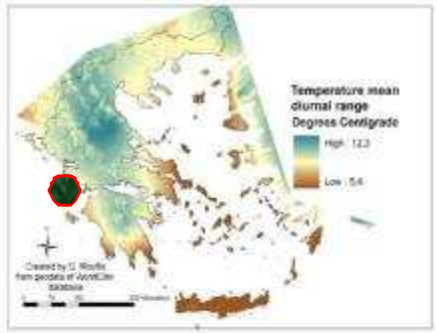
a target-plant collected from a target-area

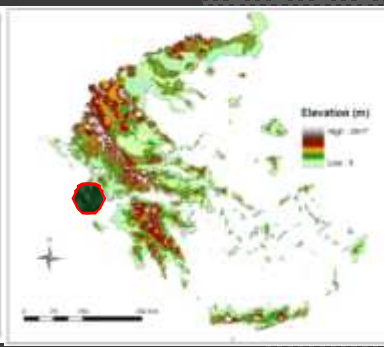
Geodatabases

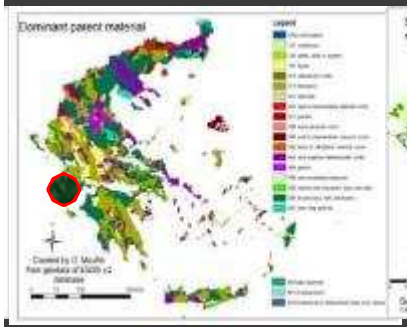


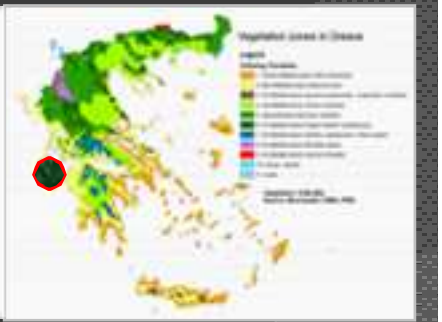


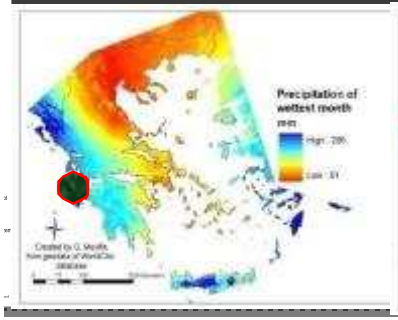


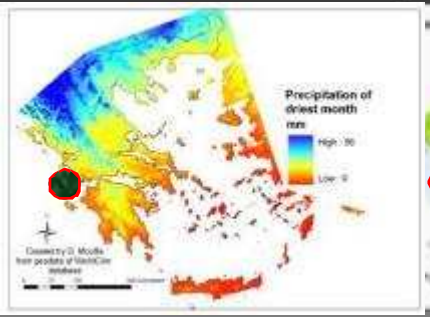






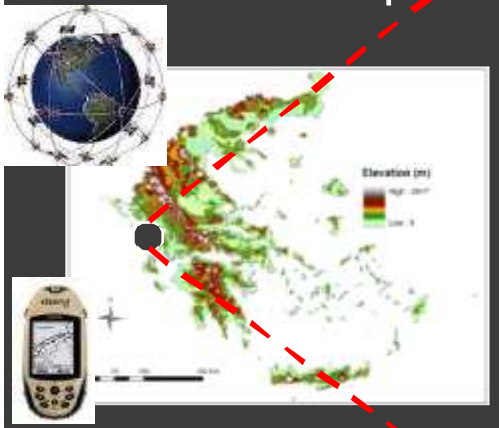






Emulation of the natural environment in BBGK using GIS

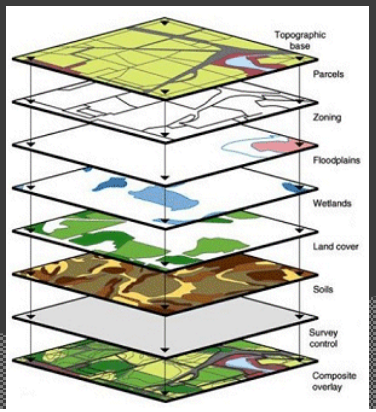
Empowering GPS coordinates for the collections of plants



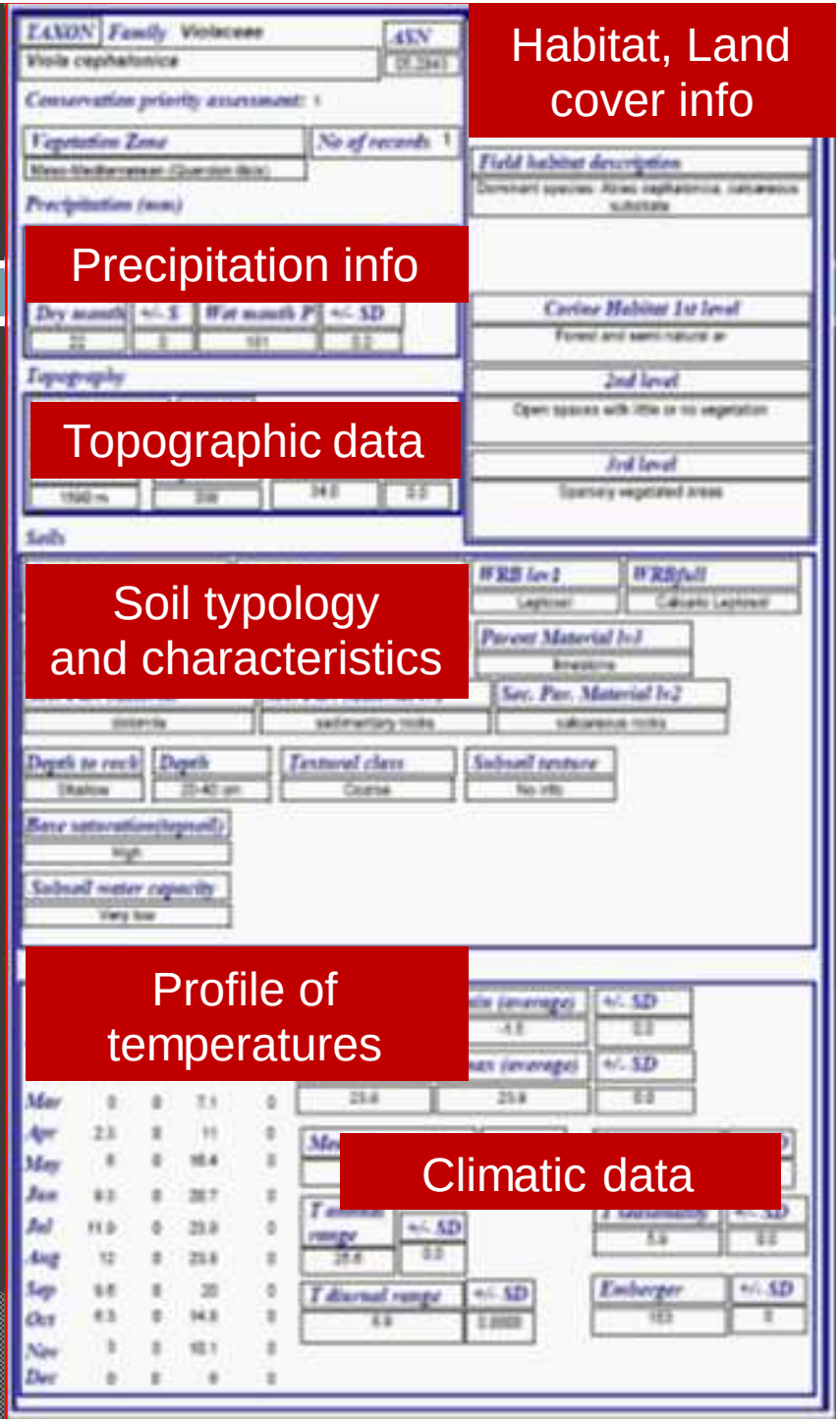
Viola cephalonica

Global **P**ositioning **S**ystem

Geodatabases

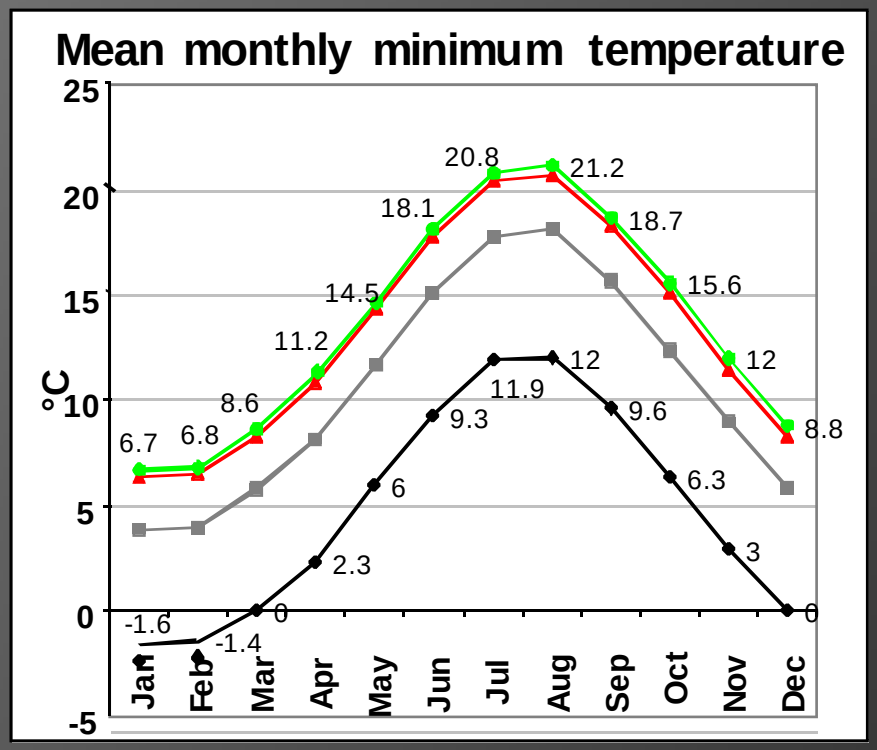


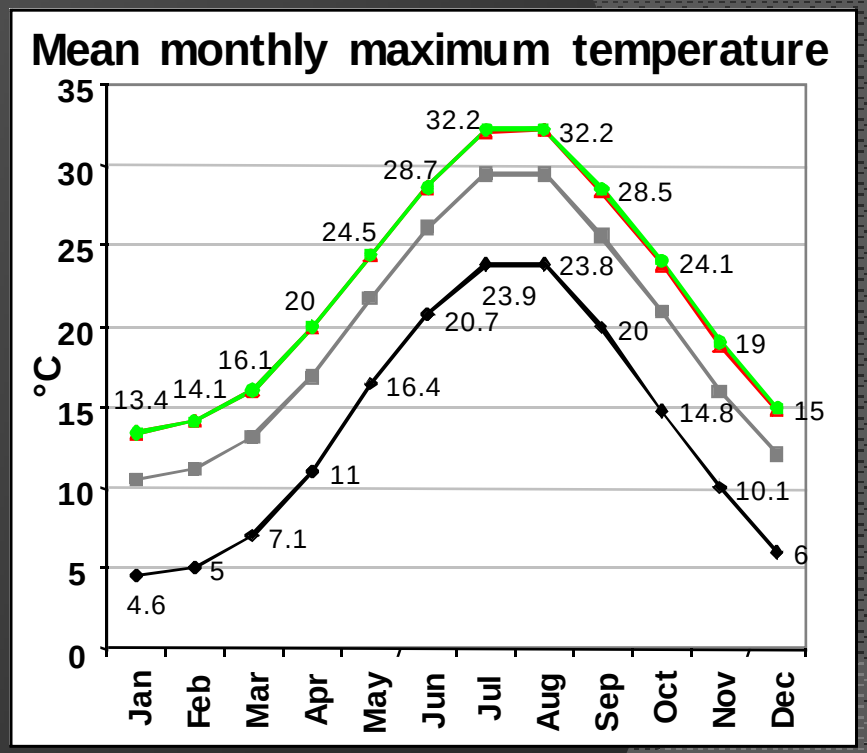
Understanding the *in-stu* ecological preferences of plants

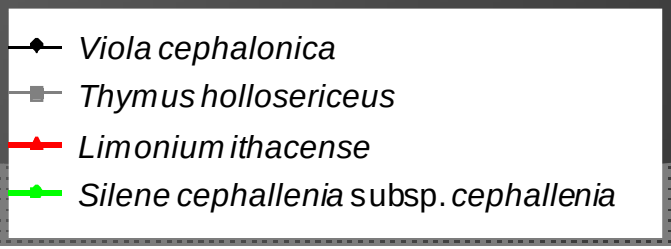


Emulation of the natural environment in BBGK using GIS

Plants originating even from the same island are adapted to different temperature extremes per month







Cultivation Guidelines

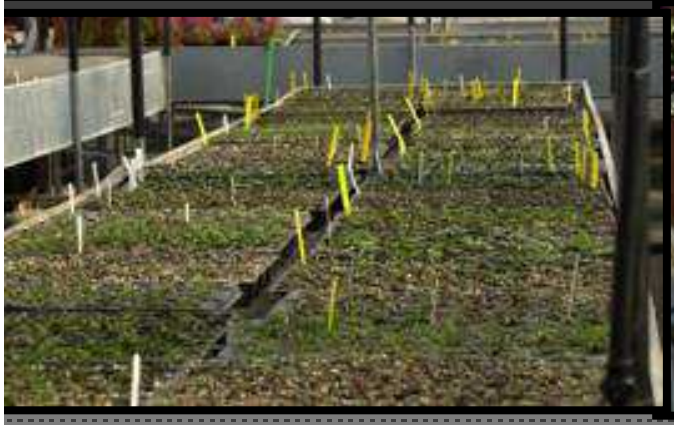
Adjustment of temperature
in controlled chambers
or periodic translocation of pots of mother plants

*ustainable exploitation+ to achieve successful propagation, the plant.s biological cycle ust be e ulated (best possible)

Propagation of plants in BBGK using GIS

Seed germination



*ustainable exploitation+ to reproduce the plant aterial, several techniques are involved)

Asexual propagation of plants in BBGK

Softwood cuttings and rooting hormones

Melissa officinalis

Cuttings in mist-bench

*ustainable exploitation+ to reproduce the plant aterial, several techniques are involved)

Asexual propagation of plants in BBGK

In vitro propagation

Centaurea citharonea

*ustainable exploitation of wild growing plants

A long-term successful procedure with benefits both for humans and nature

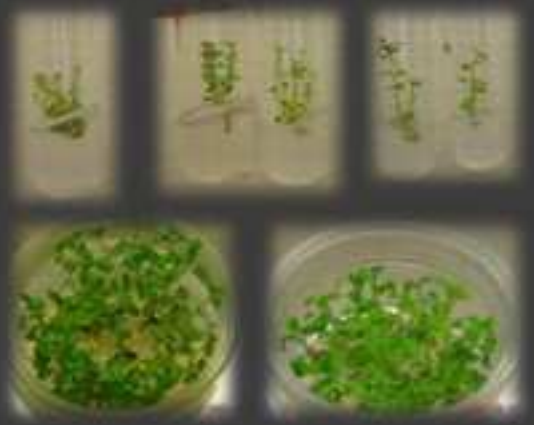
After legal collection, maintenance of mother plants and initial propagation of the wild material, different species-specific propagation and cultivation protocols can be developed.

Consequently, mass production of plants and sustainable exploitation becomes possible.

New products can be designed and marketed effeciently.

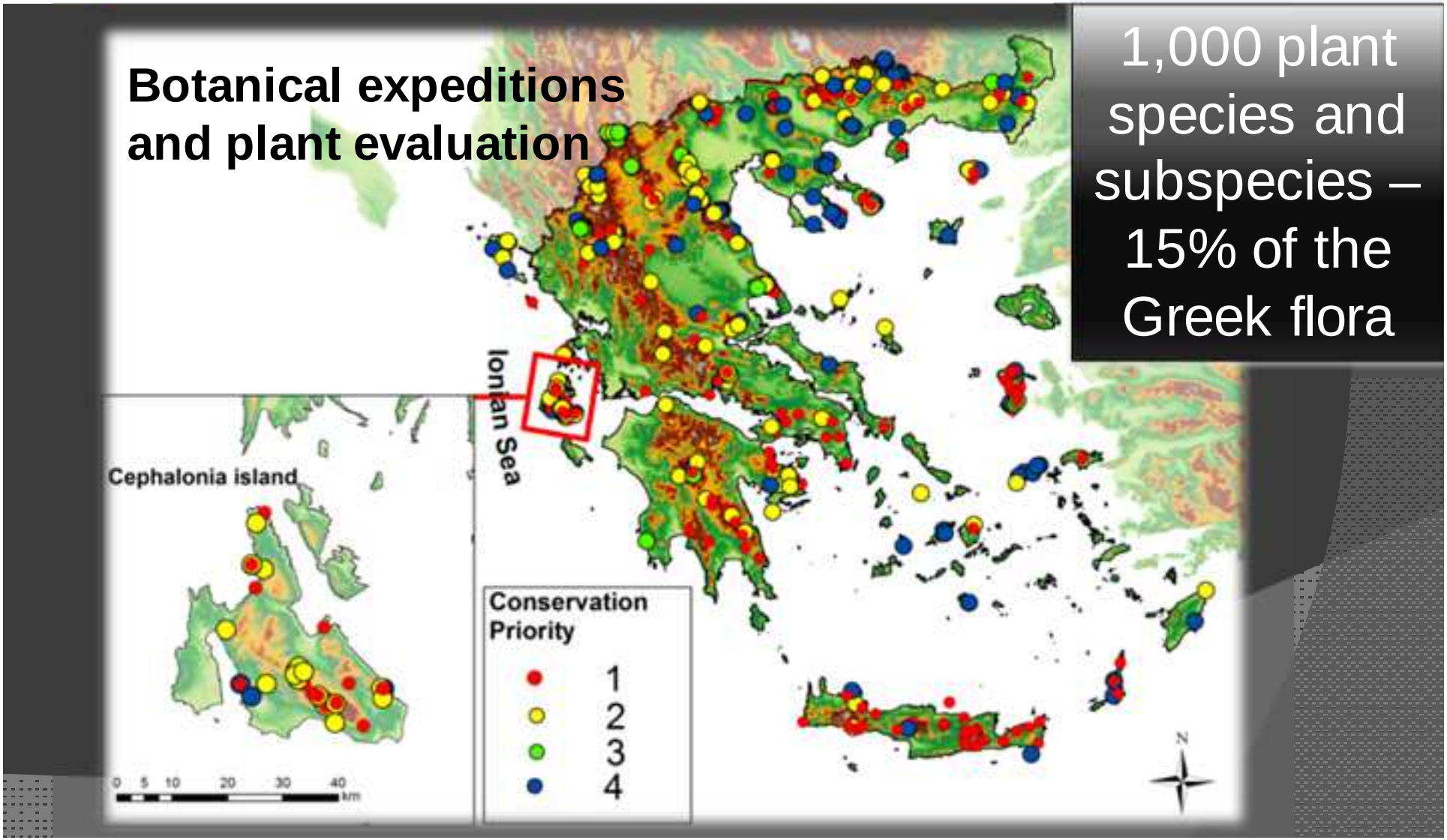
From: Maloupa, E., Krigas, N., Grigoriadou, K., Lazari, D. & Tsoktouridis, G. (2008). *Conservation strategies for native plant species and their sustainable exploitation: case of the Balkan Botanic Garden of Kroussia, N. Greece.* – Pp. 37-56 in: Teixeira da Silva J. A. (Ed.), Floriculture Ornamental Plant Biotechnology: Advances and Topical Issues (1st Edition), Vol. V (4), Global Science Books, Isleworth, UK

From botanic gardens to specialized nurseries & tissue culture laboratories



If species-specific protocols are given to the private sector, mass propagation of the selected plant material (cuttings + *in vitro*) and cultivation at a large scale is possible

The Balkan Botanic Garden of Kroussia (BBGK) is focused on the Greek flora



BBGK – Laboratory for the Conservation & Evaluation of Native and Floricultural species

Plant Conservation

Well-documented accessions of native Greek plants originating from the wild

BBGK – Laboratory for the Conservation & Evaluation of Native and Floricultural species

Plant Research

Development of species-specific cultivation and propagation protocols

BBGK – Laboratory for the Conservation & Evaluation of Native and Floricultural species

Evaluation of plants

Medicinal, cosmetic, flavoring, floricultural, landscaping and ornamental properties of the native plants of Greece are explored

BBGK – Laboratory for the Conservation & Evaluation of Native and Floricultural species

Adult training-workshops

20 workshops (2012-2014)

Example of adult training-workshop in collaboration with the Cyclades Prefecture and the local Commercial Chamber

Live streaming: www.e-kyklades.gr

Workshop themes:

- Richness of Greek flora
- Aromatic and medicinal plants
- Propagation, cultivation, processing, trade
- Practical training (preparation of food, cosmetic and medicinal products)

Location: 11 islands of Cyclades (Aegean Archipelago)

Participants: c. 450 local inhabitants

Duration: 25 days

Summer 2013

Example of adult training-workshop in collaboration with the Cyclades Prefecture and the local Commercial Chamber

Live streaming: www.e-kyklades.gr

Summer 2013

Together with scientific teams of the Schools of Pharmacy and Biology of the Aristotle University of Thessaloniki (Greece):

The aromatic and medicinal properties of selected plants are studied qualitatively and quantitatively in order to:

(a) produce *new crops* originating from the wild flora of Greece, and

(b) design *novel products* with high-added value.

Melissa officinalis propagated & cultivated at the Balkan Botanic Garden of Kroussia, N Greece

Applied research and experimentation with natural products

BBGK – Laboratory for the Conservation & Evaluation of Native and Floricultural species

Book publication on aromatic and medicinal plants (propagation, cultivation, processing, product design, quality assurance, vertical production)

BBGK – Laboratory for the Conservation & Evaluation of Native and Floricultural species

Publication of peer-reviewed papers


VERSITA

Central European Journal of Biology

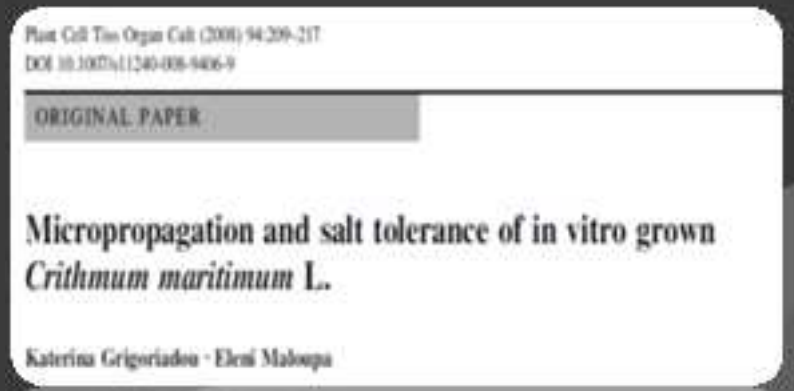
Effect of temperature and light on seed germination of *Erysimum naxense* and *Erysimum krendlii*

Research Article


ORIGINAL PAPER

GIS-facilitated in vitro propagation and ex situ conservation of *Achillea occulta*

Katerina Grigoriadou · Nikos Krigas · Eleni Maloupa


ORIGINAL PAPER

Micropropagation and salt tolerance of in vitro grown *Crithmum maritimum* L.

Katerina Grigoriadou · Eleni Maloupa

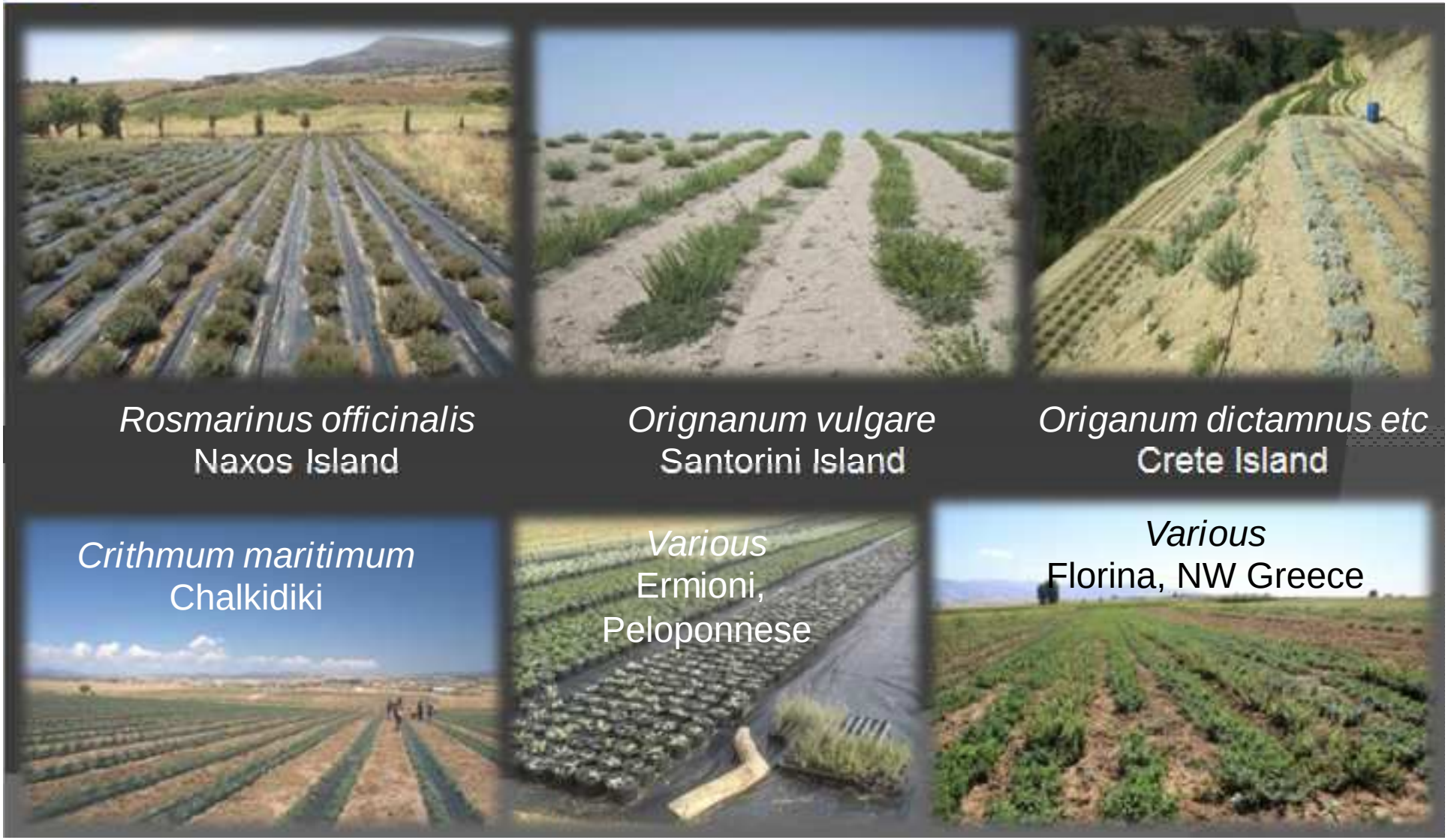
BBGK – Laboratory for the Conservation & Evaluation of Native and Floricultural species

Consulting for farmers and enterprises





Consultation and support to growers



New crops for sustainable exploitation

Rock samphire or sea fennel (*Crithmum maritimum*, Apiaceae)

Wild plants

Cuttings (propagation protocol)

Pilot cultivation (protocol)

Large-scale cultivation

Funded by the National Research and Development Council

Design of new food products

Collaboration of BBGK with ARI company for food products that include *Crithmum maritimum*

Funded by the National Research and Development Council

Design of aromatic olive oils, vinegars and food additives

http://www.dioscurides.gr/

Collaboration with the private sector

Design of new aromatic salts

http://www.dioscurides.gr/

Collaboration with the private sector

Design of new cosmetic products

http://www.iama.gr

Collaboration of BBGK with Iama company for the production of cosmetic products with *Crithmum maritimum*

Collaboration with the private sector

Design of new cosmetic products

http://www.minoanlife.com/ http://cretanherbalchem.com/

Cretan HerbalChem

Collaboration with the private sector

The market demand for new ideas and exceptional natural products is high

http://www.tuvunu.com/

Design of herbal teas

http://www.dioscurides.gr/

Collaboration with the private sector

Design of herbal teas

http://pegasus-bio.gr/

Collaboration with the private sector

Design of herbal teas

http://www.herbasacra.gr/

Collaboration with the private sector

Design of herbal teas

http://organicislands.gr/

Collaboration with the private sector

Design of new blends for herbal teas

…based on the uniqueness of Greek aromatic plants

Design of new blends for herbal teas

http://oreanthi.com/

Collaboration with the private sector

Design of new blends for herbal teas

http://www.anassaorganics.com/

Collaboration with the private sector

Culinary concepts and gastronomy

Culinary concepts and gastronomy

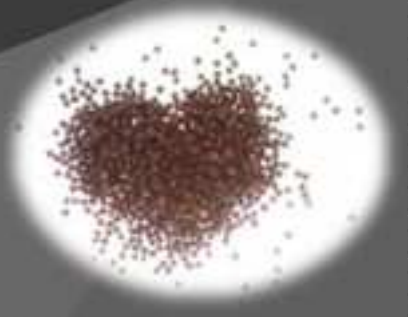
Master classes in gastronomic events

Athens, 2014

Collaboration with the Ministry of Agricultural Development and Foods

Trade regulation for propagation material of aromatic and medicinal plants

Regulation for registration of cultivars of aromatic and medicinal plants



Close collaboration with the Association of Aromatic and Medicinal Plants of Greece

- Promotion of the association for attracting new members
- Build bridges for producers and processors with applied and basic research centers
- Utilization of high-yield aromatic and medicinal plants for products of high quality
- Awareness-raising regarding the business ris involved in the sector
- Promotion of good practices for consultation
- !"ploitation of the living collections of the BB#$
- Awareness% life-long learning and training of people involved in the sector

Belonging to a governmental organization, BBGK's approach has the ultimate goal to…

…safeguard the threatened Greek plants

and

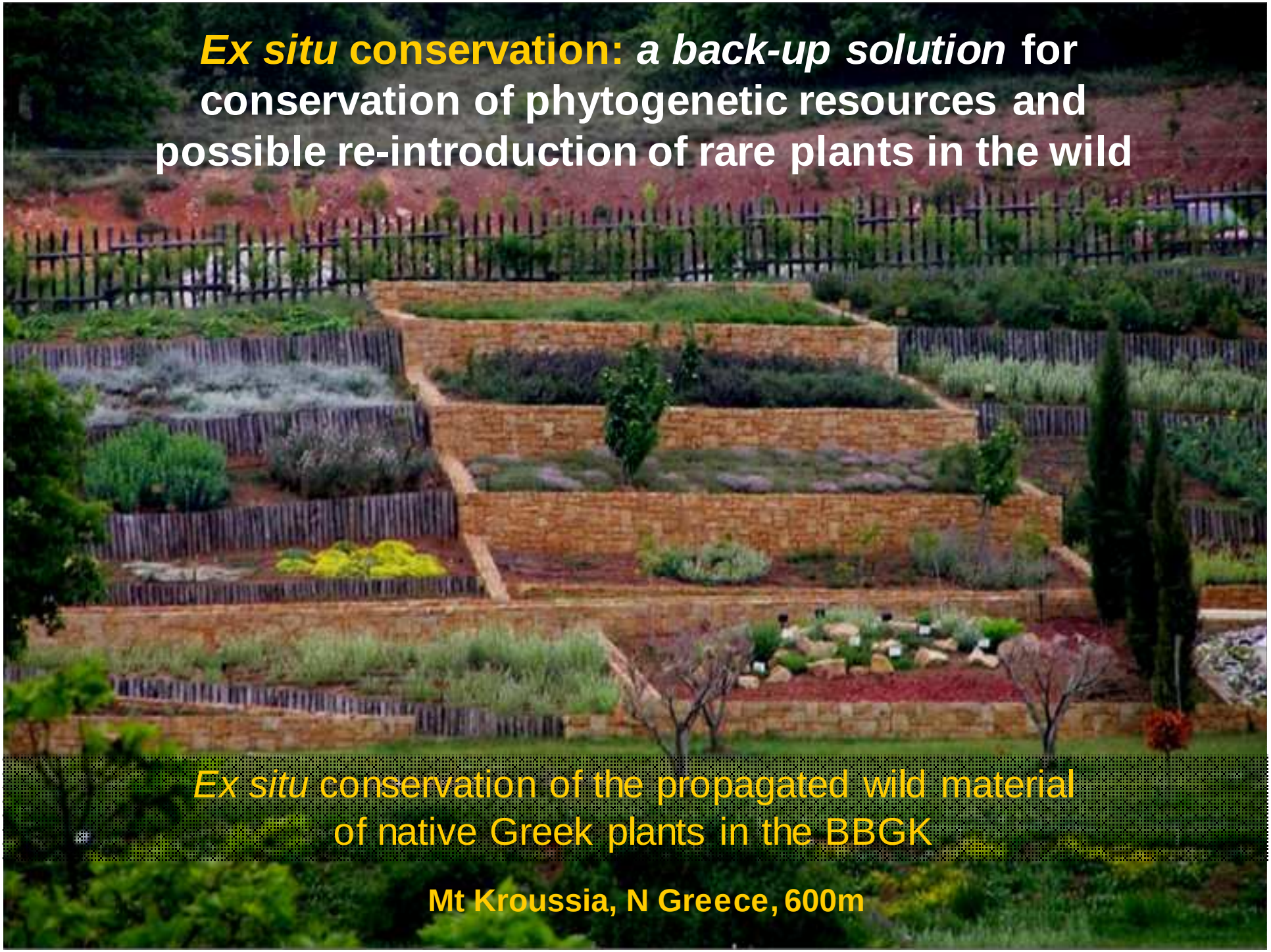
…deliver well documented, promising, new native crops which are

carefully selected and designed,

sustainably produced and managed,

successfully launched in the market and

fair-traded nationally and internationally.


Ex situ conservation: *a back-up solution* for conservation of phytogenetic resources and possible re-introduction of rare plants in the wild
Ex situ conservation of the propagated wild material of native Greek plants in the BBGK
Mt Kroussia, N Greece, 600m

Ex situ conservation: *the best solution* for sustainable exploitation of phytogenetic resources

BBGK: towards the establishment of a national network of botanic gardens in Greece

Established botanic gardens and parks: 9

Botanic gardens under establishment: 3

Botanic gardens Scheduled: 3

Our vision: Each Greek region with a botanic garden committed to the conservation and sustainable exploitation of the local flora

Why a botanic garden in Rhodes?

Rich & unique wild flora in the Dodekanese

Bigger city in the Dodekanese

Tradition in landscaping (rare in Greece), Increased tourism

Existing infrastructure in public property (96 ha)

High plant production yearly, distribution of plant material

Connection with local and regional citizens

Educational activities already organised, public involvement

Initial plan developed, budget approved

Strong will of local authorities?

A step towards the Rhodian Botanic Garden:

Creating the path of biodiversity in Rhodes

Inventory of all wild growing plant populations in selected area
Taxonomic identification of specimens
Literature search for:

- plants' medicinal and/or aromatic properties
- plants' potential to attract bee populations
- total known range (distribution)

BENEFITS

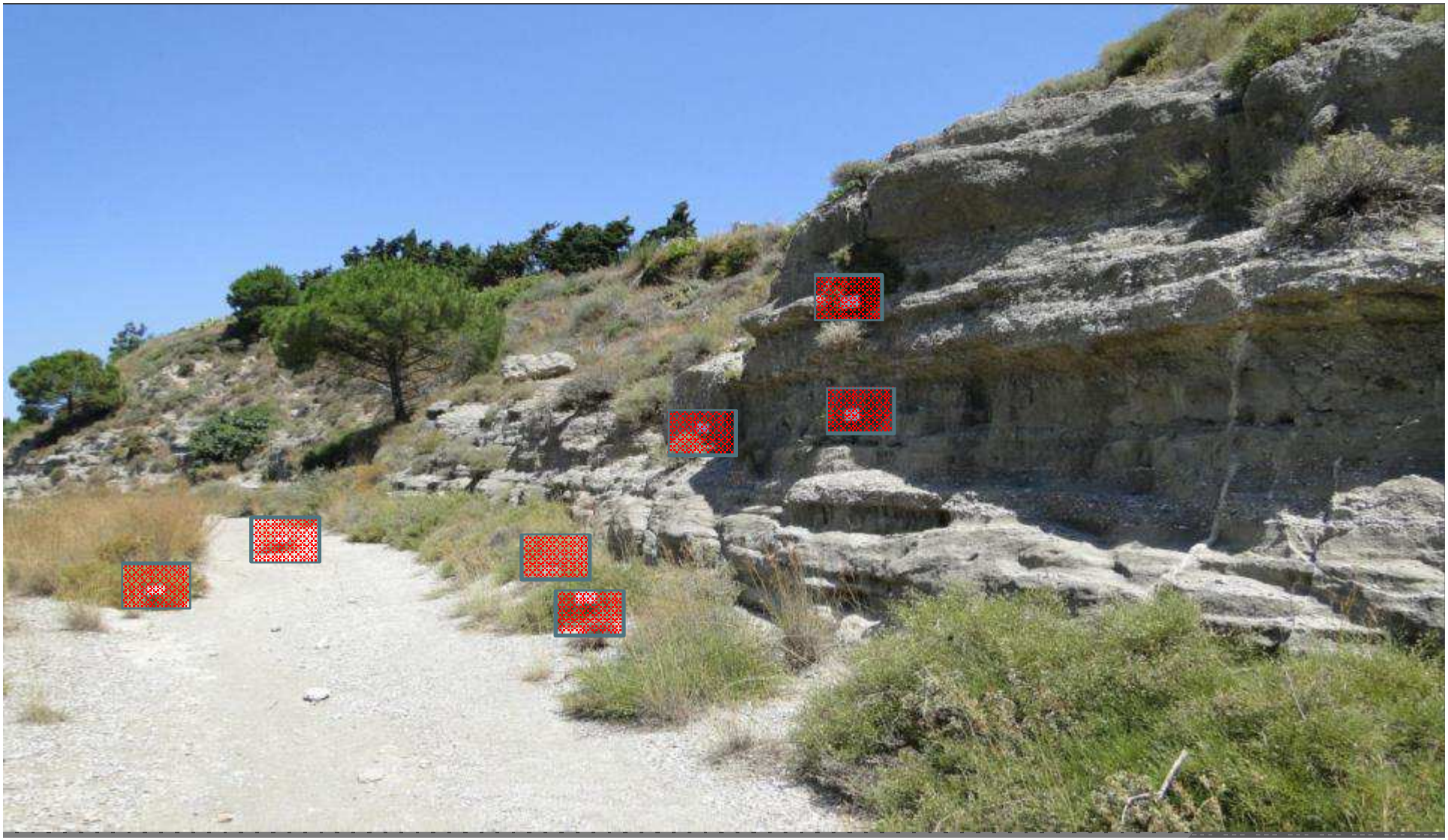
The wild plant populations and the tag information can be used for environmental awareness actions.
The path shows to people the local wild flora.
The nursery of the South Aegean can use these plants as mother plants for further propagation.

A step towards the Rhodian Botanic Garden:

Creating the path of biodiversity in Rhodes

A step towards the Rhodian Botanic Garden:

Creating the path of biodiversity in Rhodes



A step towards the Rhodian Botanic Garden:

Creating the path of biodiversity in Rhodes

Plant identity tags in the path of biodiversity

Indication for medicinal-aromatic properties or bee attraction

Family

! abaceae

Scientific name

Thymbra capitata (L.) Cav.

Author

(=*Coridothymus capitatus*)

Greek name

Θυμάρι

English name

Cone head Thyme

Distribution

"#$%&μ$'&($ι)*+

, teno - editerranean

The path of biodiversity in Rhodes

Dynamic plant display (seasonal differences)

100+ plant taxa (species and subspecies) to date

Stands of 40 perennials indicated with 85 tags so far

90% with medicinal and/or aromatic properties

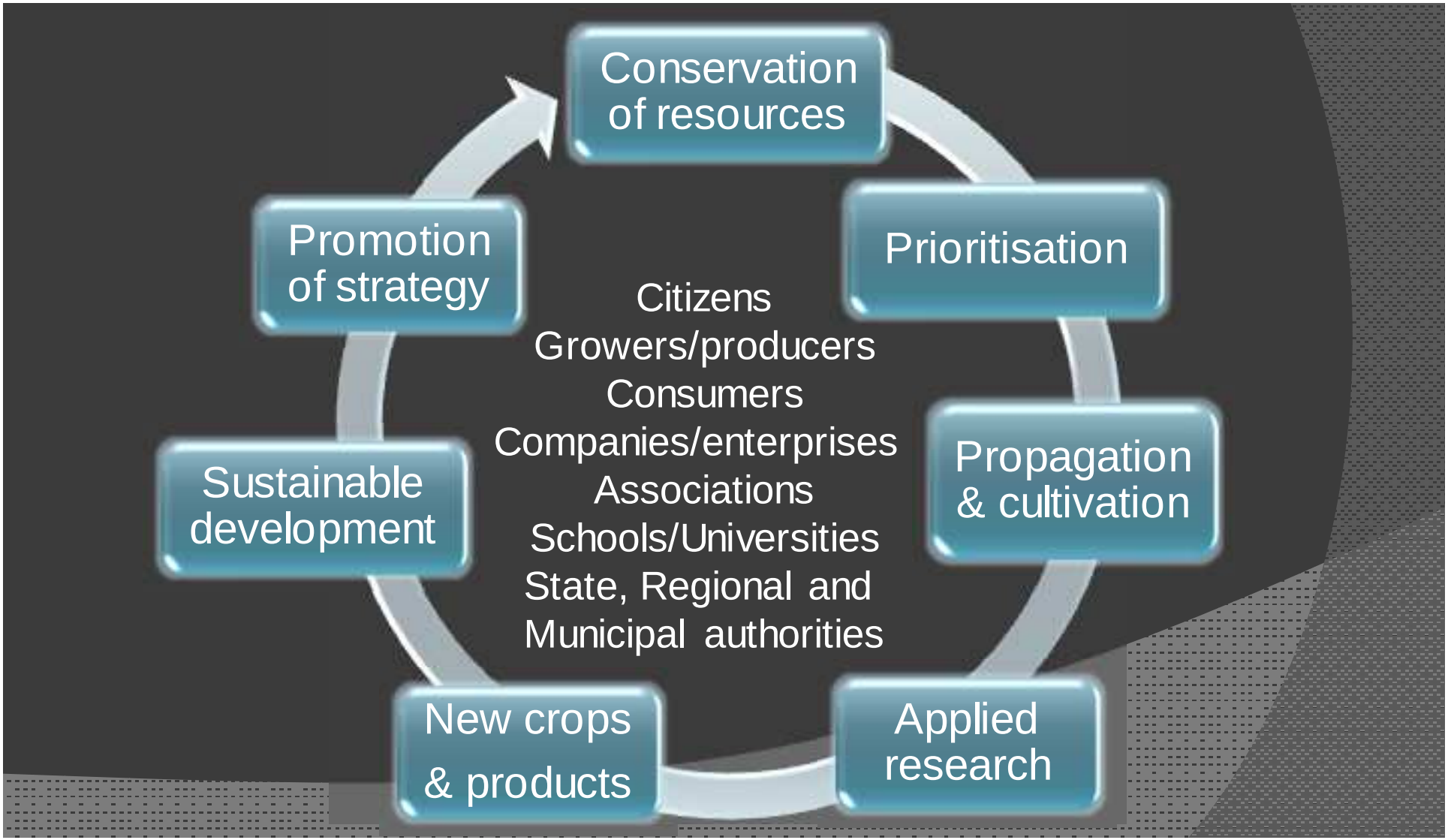
75% attracting bee populations

50% Steno-Mediterranean endemics

Onopordum rhodense

(Rhodian endemic)

BBGKS's conservation strategy summarised



Support the conservation of plant diversity on local scale.

Support the sustainable use of wild plants on regional scale.

Ensure a better future for the wild plants globally.


MINT
HAPPINESS
MOUNTAIN TEA
Thank you for your attention