



4th Mediterranean Plant
Conservation Week

VALÈNCIA | 23-27 OCTOBER | 2023

7th Thematic session:
International networks for the
conservation of
Mediterranean flora and
habitats



An international network for the protection of sexual and parthenogenetic populations of streptophytic green macroalgae (*Chara canescens*)

María A. Rodrigo

Adriana Arnal

Karl-Georg Bernhardt

Pablo García-Murillo

Riccardo Guarino

Karin Tremetsberger

Angelo Troía

Barbara Turner

Johanna Weitzel

Hendrik Schubert



ICBiBE
Institut Universitari Cavanilles
de Biodiversitat i Biologia Evolutiva



UNIVERSITÀ
DEGLI STUDI
DI PALERMO



Universität für Bodenkultur Wien
University of Natural Resources
and Life Sciences, Vienna

Universität
Rostock



27/10/2023



K. van de Weyer



Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains



biodiversa+
European Biodiversity Partnership



International networks for the conservation of Mediterranean flora and habitats

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

Keeping genetic diversity is a key element of conservation approaches!

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Parthenogenetic reproducing species, lacking at least part of the recombination mechanisms, are far more susceptible to loss of genetic diversity than sexual reproducing ones.

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

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4th Mediterranean Plant Conservation Week
VALÈNCIA | 23-27 OCTOBER | 2023

**6th Thematic session:
Experiences of Cryptogam
conservation in the
Mediterranean**

ProPartS

**Rare or common? Developing protection schemes
for bisexual-parthenogenetic species**

Adriana Arnal
Karl-Georg Bernhardt
Pablo García-Murillo
Riccardo Guarino
María A. Rodrigo
Angelo Troia
Barbara Turner
Johanna Weitzel
Hendrik Schubert

UNIVERSITAT ID VALÈNCIA (U#)
ICBiBE
Institut Universitari Cavanilles
de Biodiversitat i Biologia Evolutiva

UNIVERSIDAD DE SEVILLA

UNIVERSITÀ DEGLI STUDI DI PALERMO

BOKU
Universität für Bodenkultur Wien
University of Natural Resources
and Life Sciences, Vienna

Universität Rostock

25/10/2023



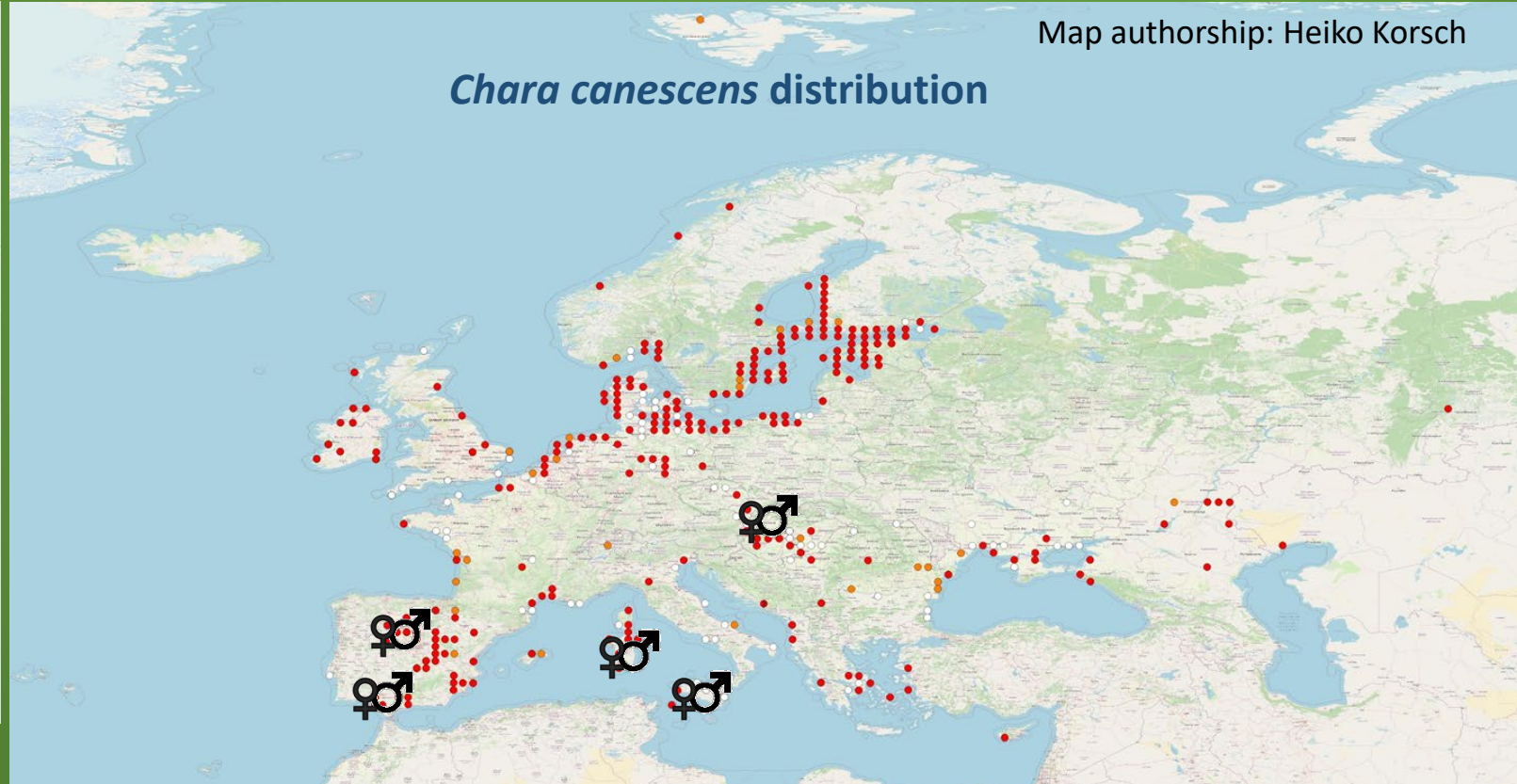
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A male
Chara canescens



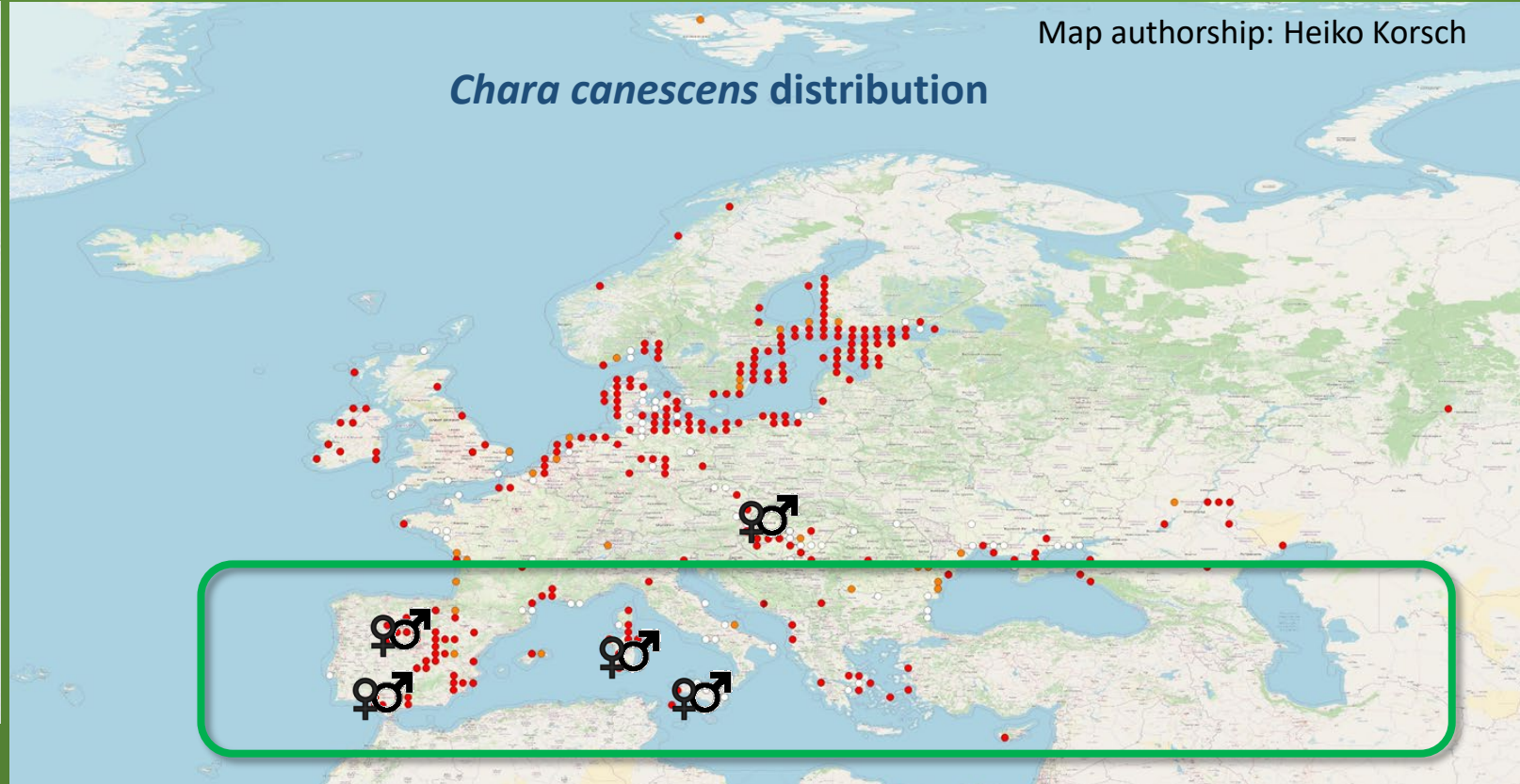
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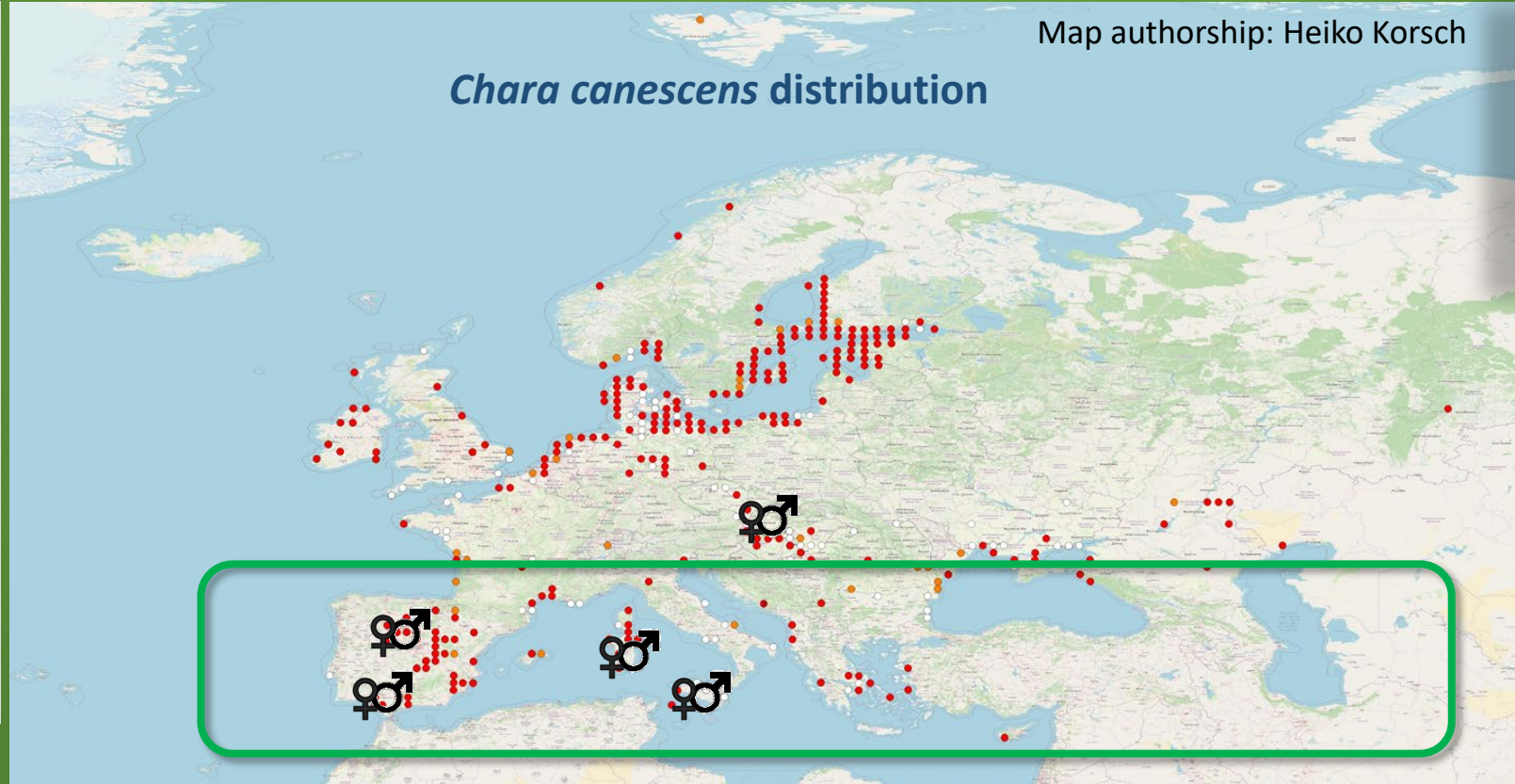
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Investigating:

role of sexual ancestor populations for maintaining genetic diversity



A male
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Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

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Investigating:

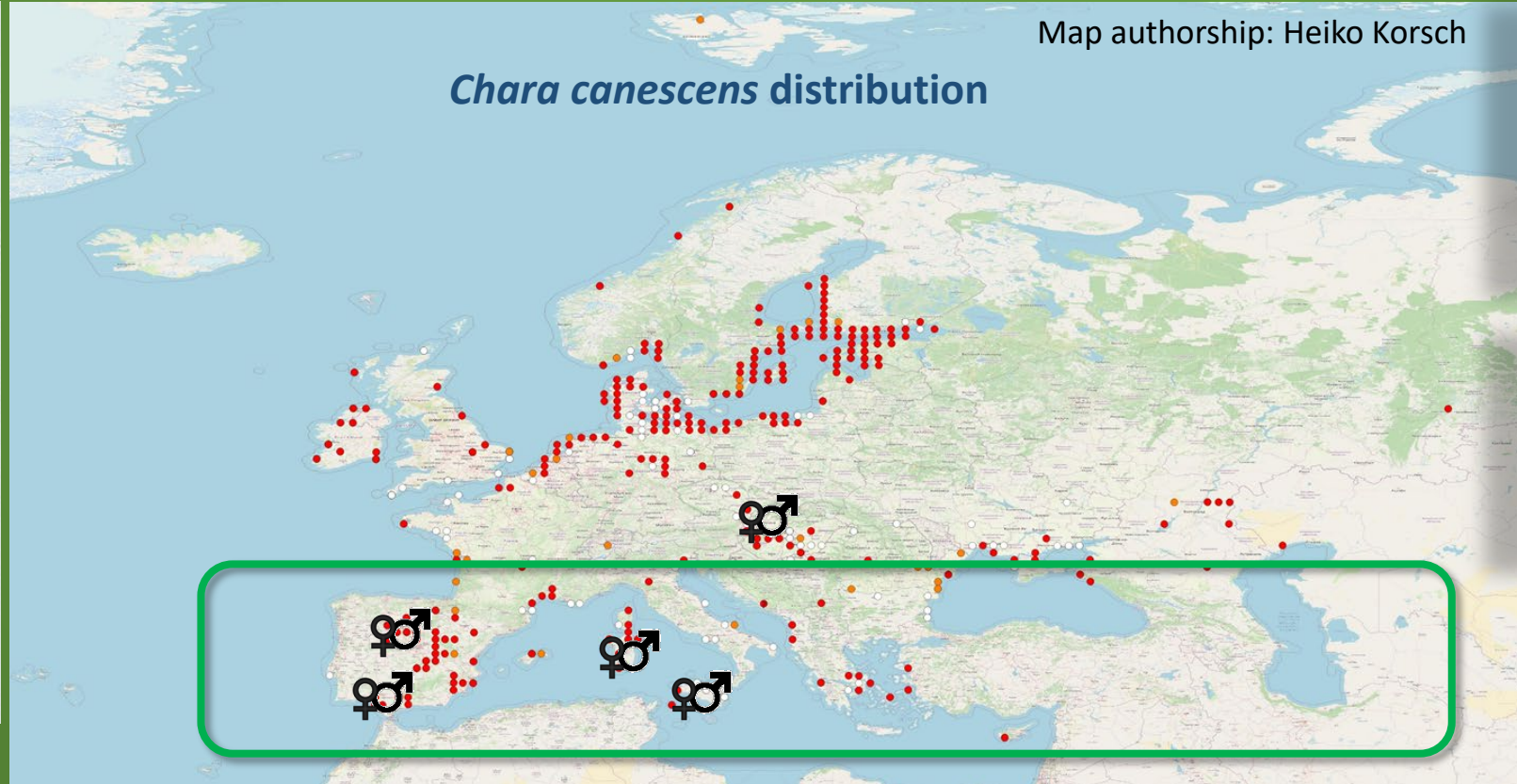
role of sexual ancestor populations for maintaining genetic diversity



the acclimation potential of parthenogenetic populations



A male
Chara canescens



Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

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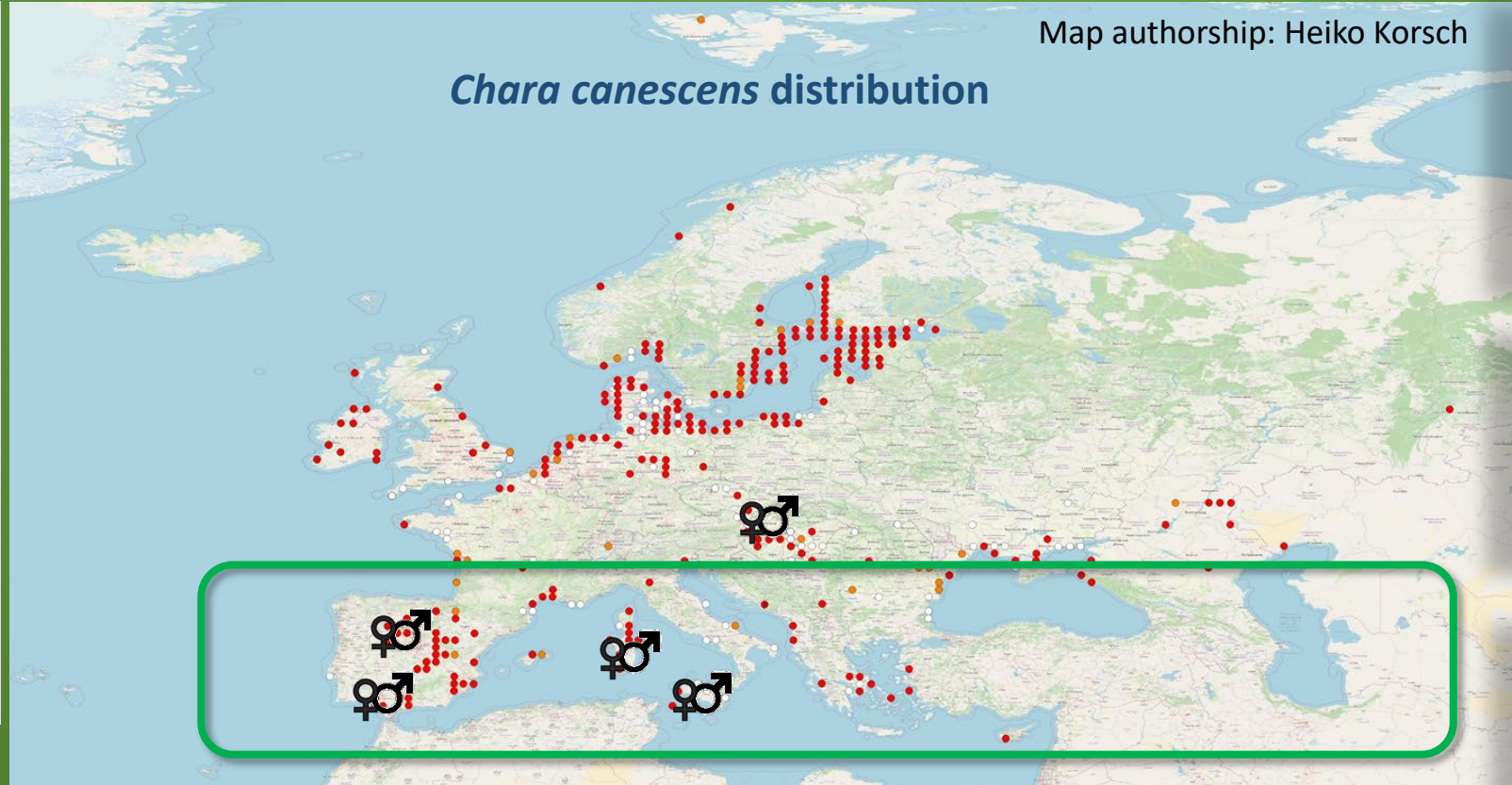
the acclimation potential of parthenogenetic populations



**OPTIMISED
CONSERVATION
STRATEGIES**



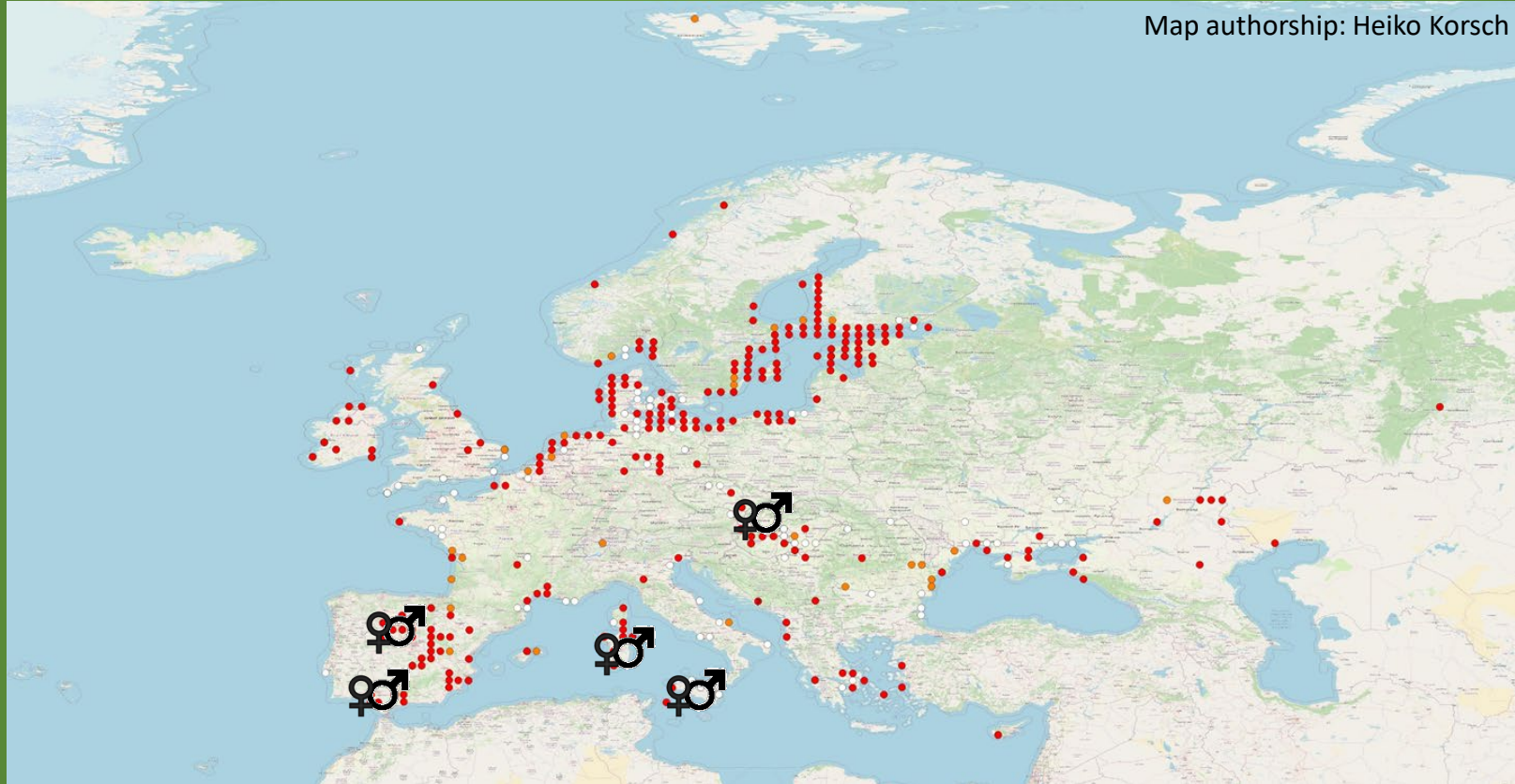
A male
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International networks for the conservation of Mediterranean flora and habitats

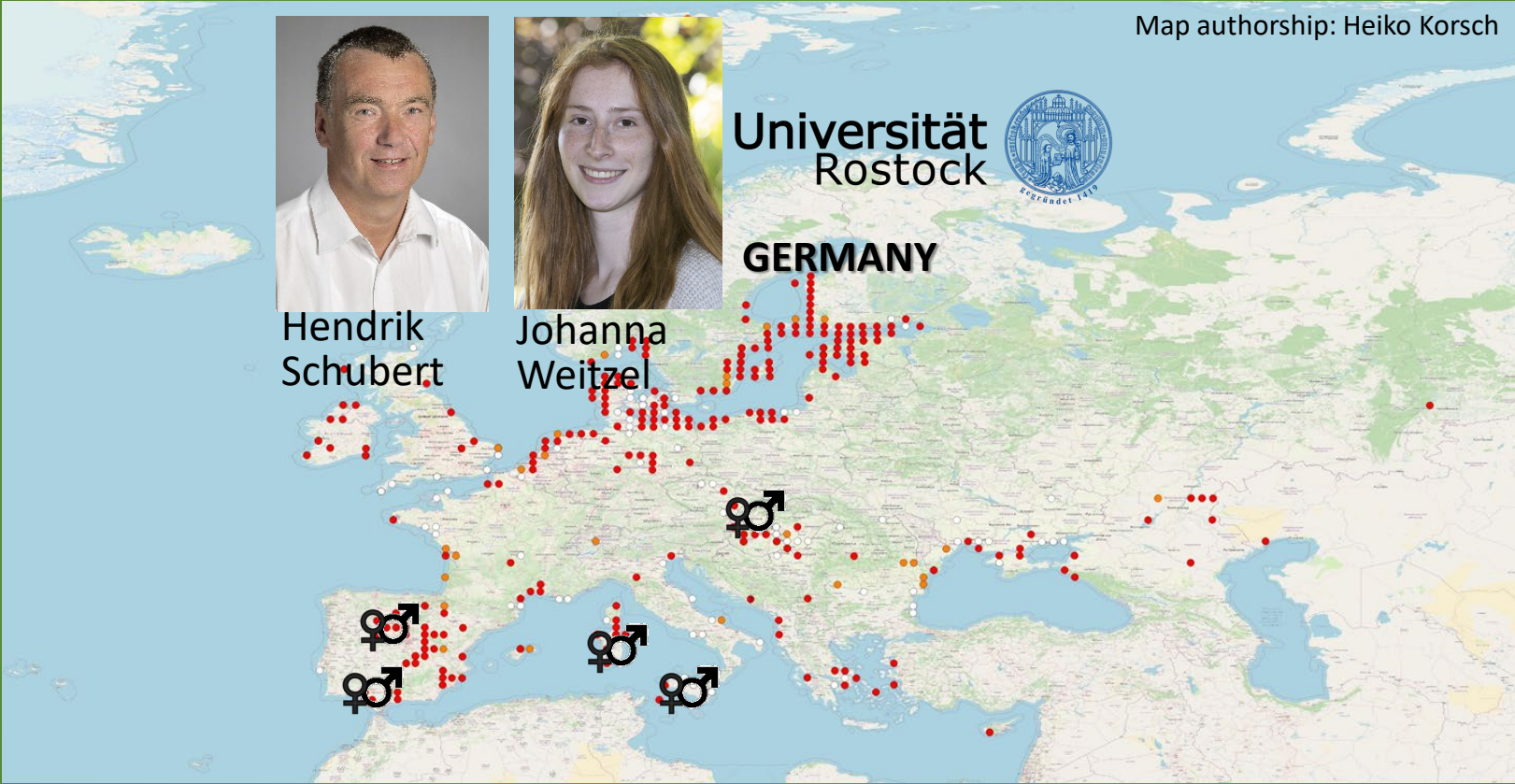
Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

The consortium



Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

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Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

The consortium

València, SPAIN

UNIVERSITAT DE VALÈNCIA  ICBiBE
Institut Universitari Cavanilles de Biodiversitat i Biologia Evolutiva



María A. Rodrigo



Adriana Arnal



Hendrik Schubert

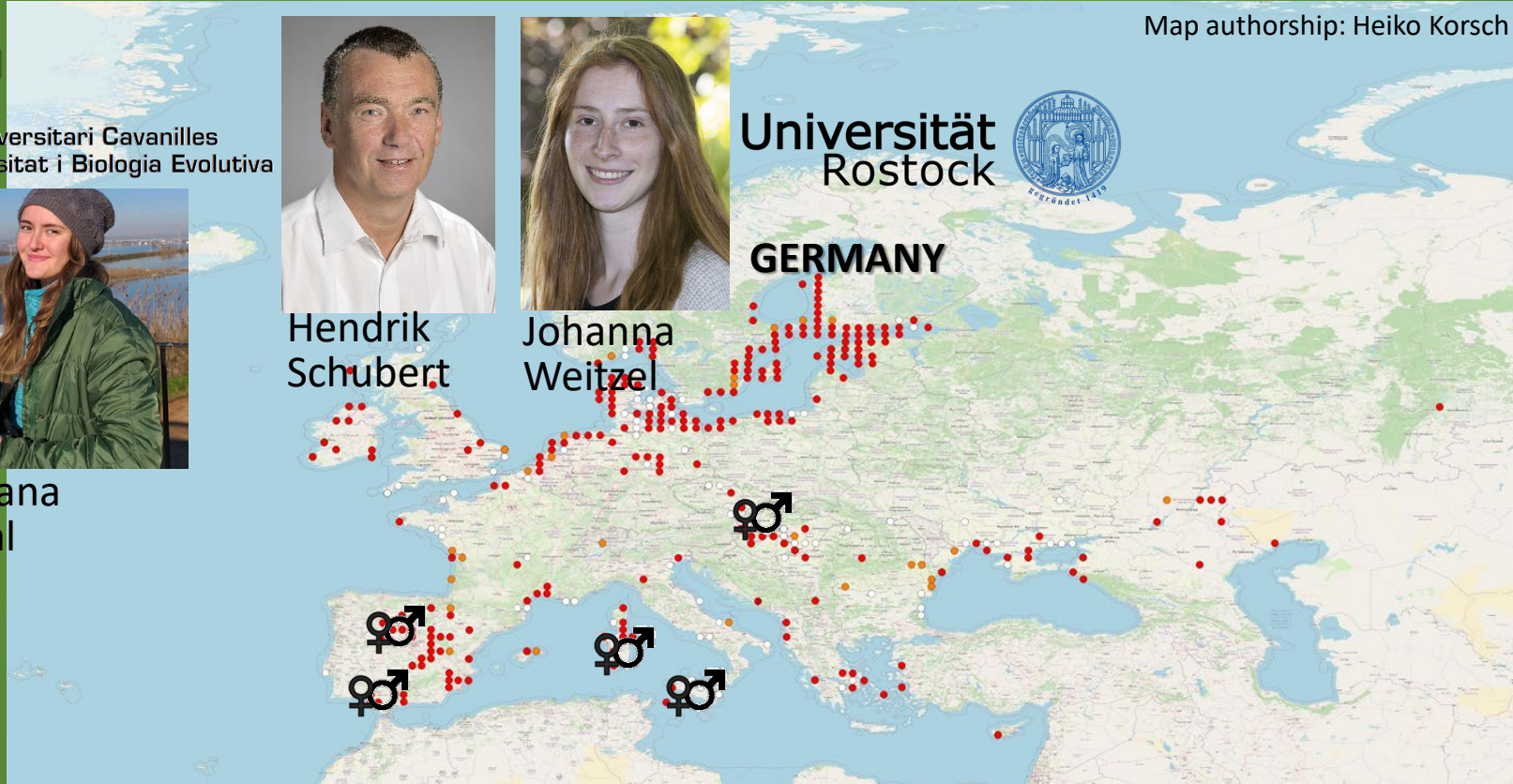


Johanna Weitzel

Universität Rostock 

GERMANY

Map authorship: Heiko Korsch



International networks for the conservation of Mediterranean flora and habitats



ProPartS

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

The consortium

València, SPAIN

UNIVERSITAT DE VALÈNCIA ICBiBE Institut Universitari Cavanilles de Biodiversitat i Biologia Evolutiva



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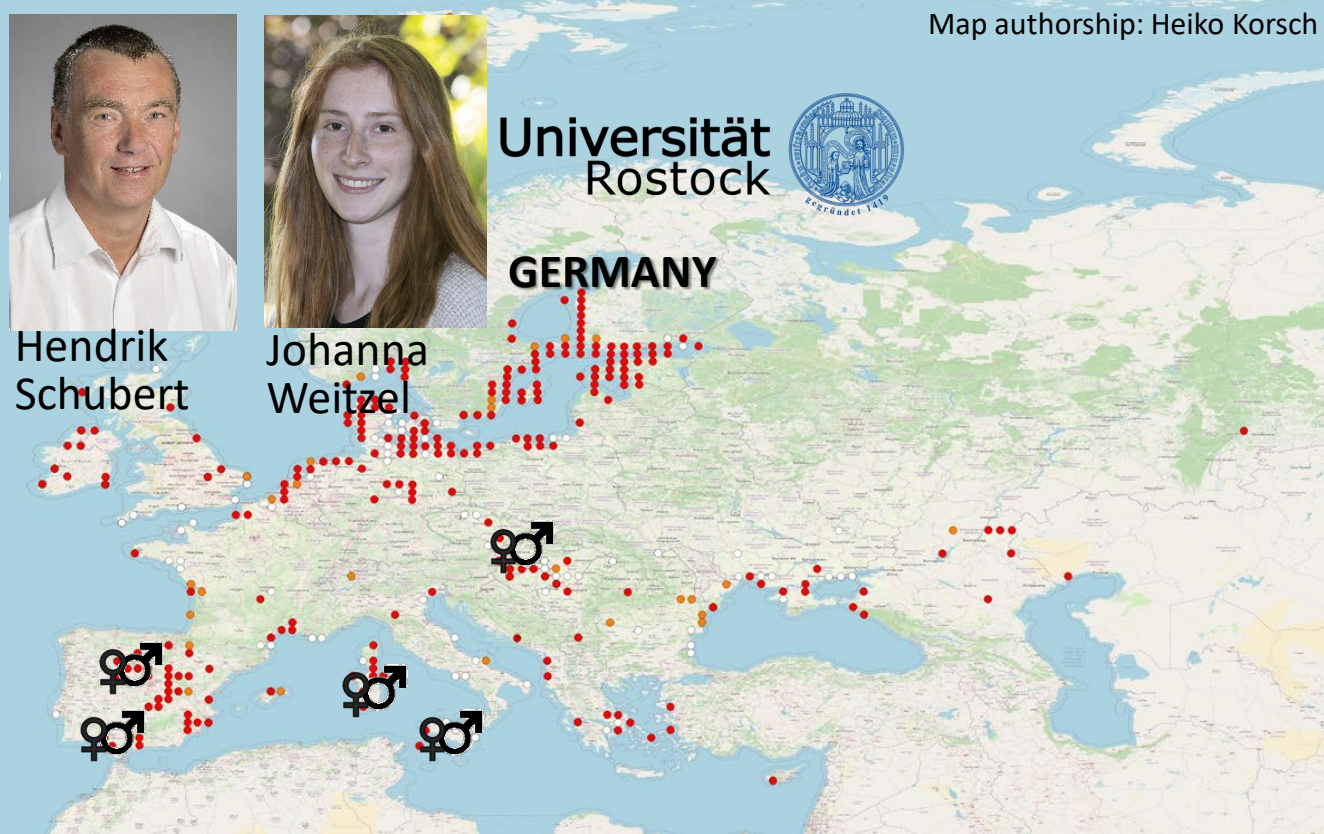
Johanna Weitzel

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GERMANY

Map authorship: Heiko Korsch



Sevilla, SPAIN



Pablo García-Murillo

International networks for the conservation of Mediterranean flora and habitats



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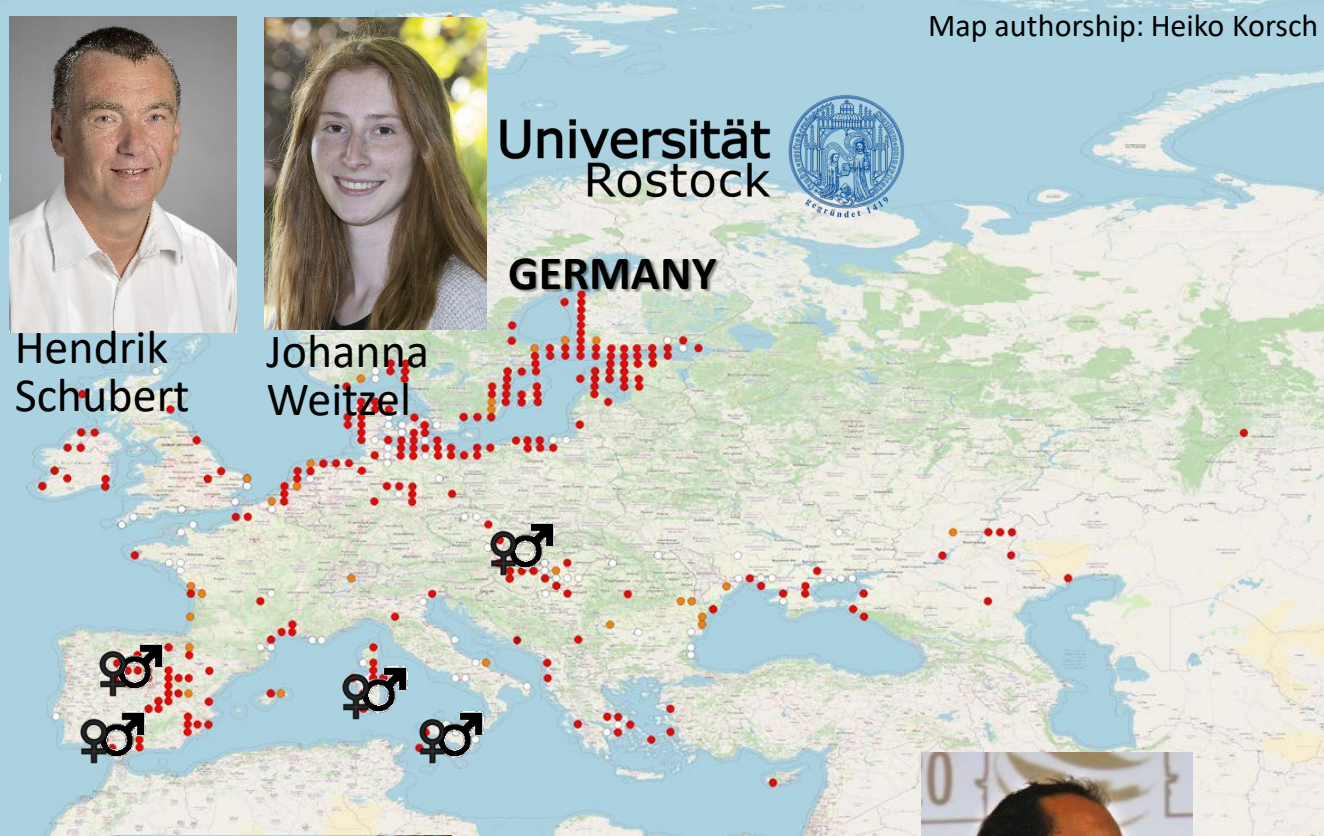
Johanna Weitzel

Universität Rostock



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Sevilla, SPAIN



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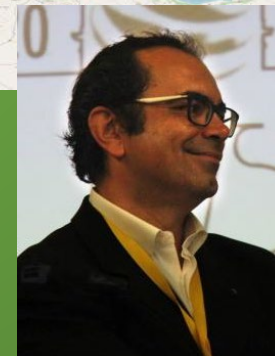


Angelo Troía

ITALY



UNIVERSITÀ DEGLI STUDI DI PALERMO



Ricardo Guarino

International networks for the conservation of Mediterranean flora and habitats



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AUSTRIA

Universität für Bodenkultur Wien
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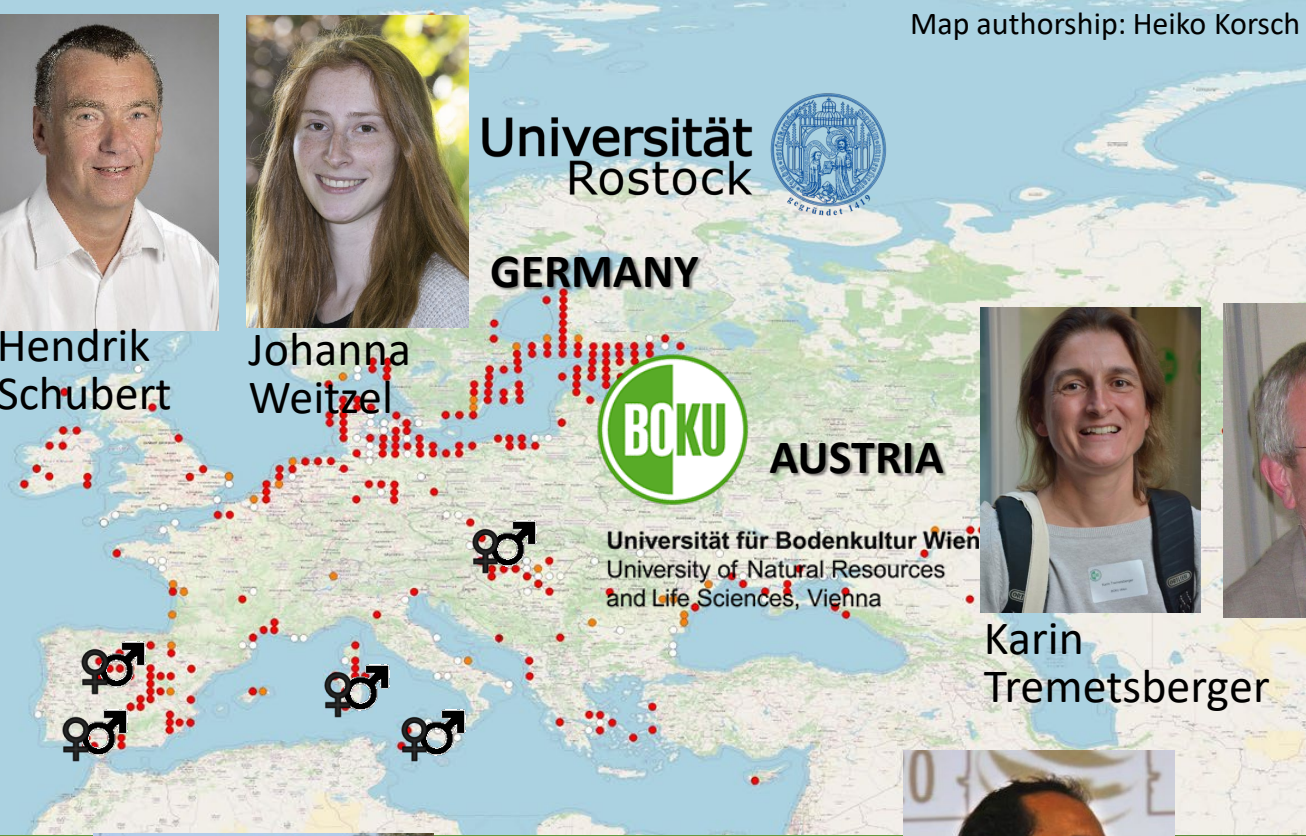
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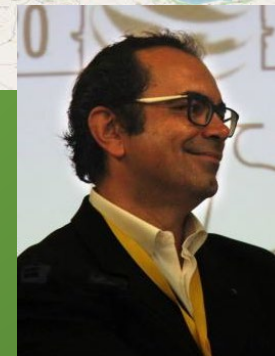


Angelo Troía

ITALY



UNIVERSITÀ DEGLI STUDI DI PALERMO



Ricardo Guarino

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

Project schedule: Working packages

year	2023			2024				2025				2026	responsible partner	
project quartile	1	2	3	4	5	6	7	8	9	10	11	12		
WP 1: identification of inland sites														PP 1 (DE)
literature analysis potential sites	■													PP 1 (DE)
mapping historical, potential and recent sites	■													PP 1 (DE)
vegetation analysis		■												PP 5 (AU)
water chemistry and hydromorphology		■												PP 5 (AU)
population genetics		■	■			■								PP 5 (AU)
Microbiome analysis				■			■							PP 1 (DE)
WP 2: gene drift / changes in population genetics														PP 5 (AU)
herbar check and material sampling	■													PP 4 (SP)
population genetics of herbar material	■	■	■					■						PP 5 (AU)
re-check of historical sites				■				■						PP 4 (SP)
WP 3: Diaspore assesement and interfertility														PP 2 (SP)
oospore analysis			■	■			■							PP 4 (SP)
vitality analysis				■				■						PP 2 (SP)
interfertility assessment					■	■	■							PP 2 (SP)
WP 4: management schemes and outreach														PP 3 (IT)
core stakeholder workshop			■	■										PP 3 (IT)
stakeholder network meeting						■								PP 3 (IT)
assessment of connectivity and gene flow										■				PP 5 (AU)
publication and dissemination				■			■	■						PP 3 (IT)

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

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Identification of inland sites



1. Literature analysis of potential sites

Identification of inland sites

International networks for the conservation of Mediterranean flora and habitats

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains



1. Literature analysis of potential sites

2. Mapping of historical, potential and recent sites

Identification of inland sites



International networks for the conservation of Mediterranean flora and habitats

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains



1. Literature analysis of potential sites

2. Mapping of historical, potential and recent sites

Identification of inland sites

3. Vegetation analysis



WP1

Universität
Rostock



Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains



1. Literature analysis of potential sites

2. Mapping of historical, potential and recent sites



Identification of inland sites

3. Vegetation analysis



4. Water chemistry and hydromorphology



Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains



1. Literature analysis of potential sites

2. Mapping of historical, potential and recent sites



Identification of inland sites

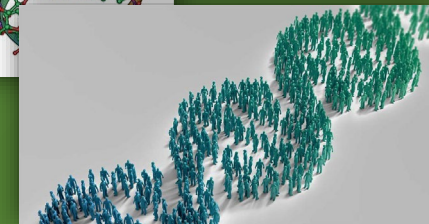
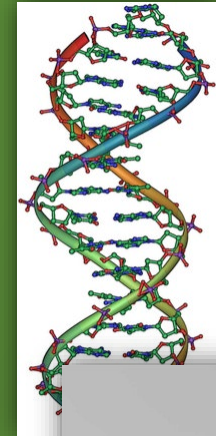
3. Vegetation analysis



4. Water chemistry and hydromorphology



5. Population genetics





Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains



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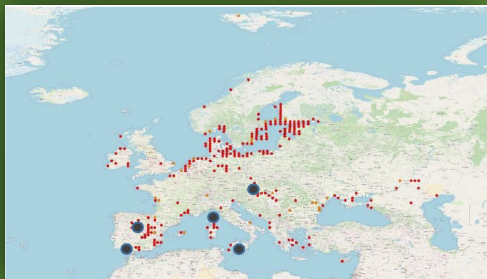
6. Microbiome analysis



2. Mapping of historical, potential and recent sites

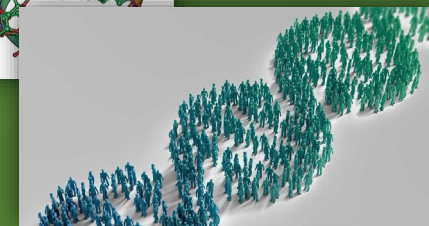
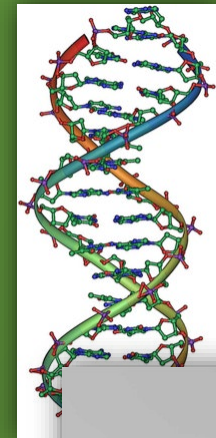
Identification of inland sites

5. Population genetics



3. Vegetation analysis

4. Water chemistry and hydromorphology

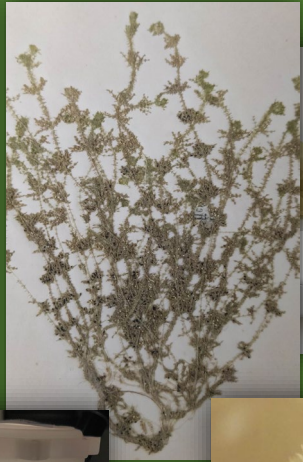


Gen drift / Changes in populations genetics



International networks for the conservation of Mediterranean flora and habitats

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains



**1. Herbar check
and material
sampling**


**Gen drift / Changes in populations
genetics**



WP2

Universität für Bodenkultur Wien
University of Natural Resources
and Life Sciences, Vienna

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains



1. Herbar check
and material
sampling



Gen drift / Changes in populations
genetics



2. Population
genetics of herbar
material



WP2

Universität für Bodenkultur Wien
University of Natural Resources
and Life Sciences, Vienna

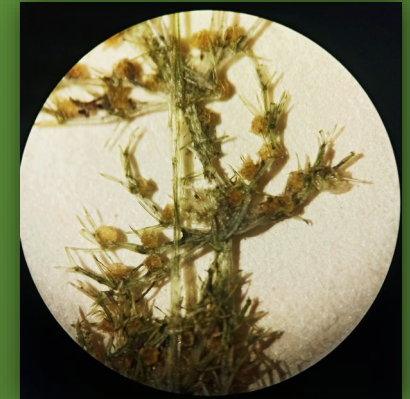
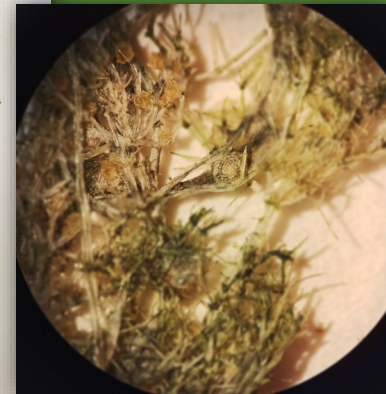
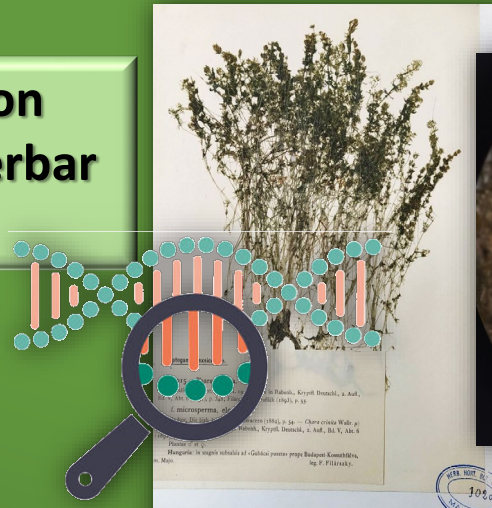
Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

1. Herbar check and material sampling

3. Re-check of historical sites

Gen drift / Changes in populations genetics

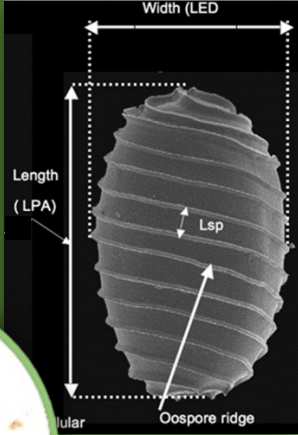
2. Population genetics of herbar material



WP2

Universität für Bodenkultur Wien
University of Natural Resources
and Life Sciences, Vienna

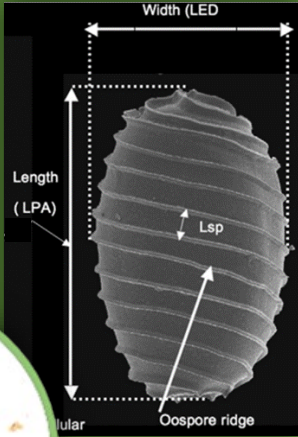
Diaspore assessment and interfertility



1. Oospore analysis

Diaspore assessment and interfertility

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains



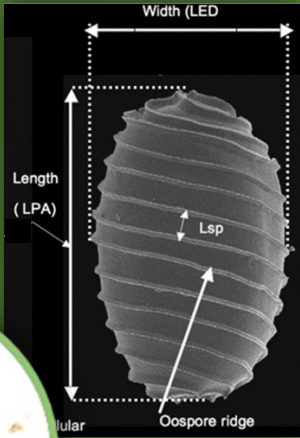
1. Oospore analysis

Diaspore assessment and interfertility

2. Vitality analysis



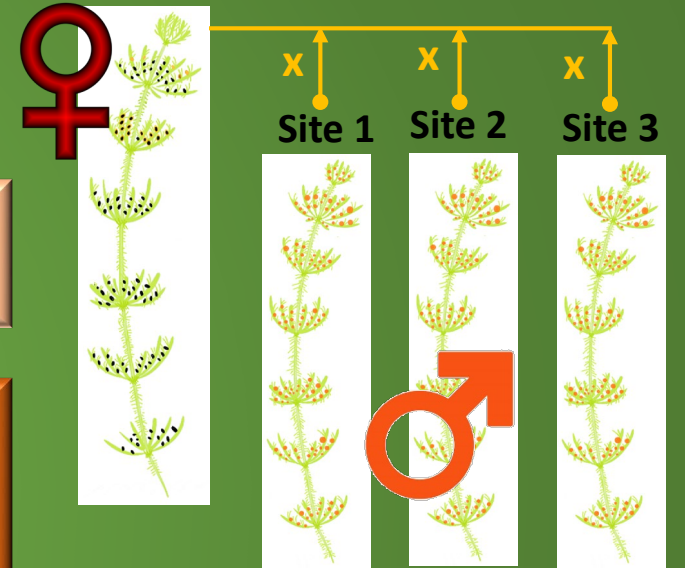
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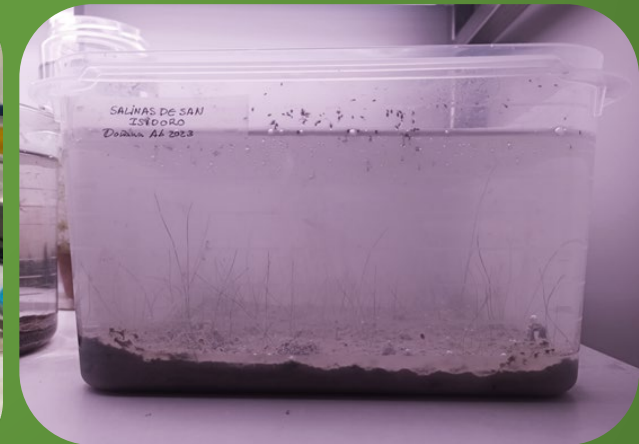
1. Oospore analysis

3. Interfertility assessment

Diaspore assessment and interfertility



2. Vitality analysis



**Management schemes and
outreach**

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

	Stakeholders			Others		
	Authorities			Environmental NGOs	Private owners/local community	Specialized Associations
	Local	Regional	National			
Austria Neusiedler Lacken	Nationalpark Neusiedler See - Seewinkel	Amt der Burgenländischen Landesregierung, Abteilung: Ländliche Entwicklung, Agrarwesen, Natur- und Klimaschutz	Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie	WWF, BirdLife		
Italy Sardinia (Pauli Murtas)	Comune di San Vero Milis	Regione Autonoma della Sardegna. Assessorato della Difesa dell'Ambiente + Agenzia regionale per la protezione dell'ambiente della Sardegna	Ministero della Transizione Ecologica. Direzione generale patrimonio naturalistico e mare	WWF, LIPU, BirdLife		
Sicity (Lago di Pergusa)	Provincia Regionale di Enna (manager of the Reserve+SAC)	Regione Siciliana: Assessorato Territorio e Ambiente + Agenzia regionale per la protezione dell'ambiente della Sicilia	Ministero della Transizione Ecologica. Direzione generale patrimonio naturalistico e mare	WWF, LIPU, BirdLife, Legambiente Sicilia	If any	
Spain Bodon Blanco (Valladolid; Castilla-León)	Ayuntamiento (city council) de Bocigas	Consejería de Fomento y Medio Ambiente. Junta de Castilla y León	Ministerio para la Transición Ecológica	WWF Ecologistas en Acción	If any	
Laguna Larga (Doñana National Park, Huelva; Andalucía)	Ayuntamiento de (city council) Almonte	Consejería de Agricultura, Ganadería, Pesca y Desarrollo Sostenible. Junta de Andalucía	Organismo Autónomo de Parques Nacionales. Ministerio para la Transición Ecológica	WWF, SEO-BirdLife, Green Peace	If any	

Scientific Community
Policy Makers
Environmental Organization
General Public

1. Core stakeholders workshop

Management schemes and outreach

WP4



International networks for the conservation of Mediterranean flora and habitats



Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

	Stakeholders			Others		
	Local	Regional	National	Environmentalist NGOs	Private owners/Local community	Specialized Associations
Austria Neusiedler Lacken	Nationalpark Neusiedler See - Seewinkel	Amt der Burgenländischen Landesregierung, Abteilung: Ländliche Entwicklung, Agrarwesen, Natur- und Klimaschutz	Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie	WWF, BirdLife		
Italy Sardinia (Pauli Murtas)	Comune di San Vero Milis	Regione Autonoma della Sardegna, Assessorato della Difesa dell'Ambiente + Agenzia regionale per la protezione dell'ambiente della Sardegna	Ministero della Transizione Ecologica, Direzione generale patrimonio naturalistico e mare	WWF, LIPU, BirdLife		
Sicily (Lago di Pergusa)	Provincia Regionale di Enna (manager of the Reserve+SAC)	Regione Siciliana: Assessorato Territorio e Ambiente + Agenzia regionale per la protezione dell'ambiente della Sicilia	Ministero della Transizione Ecologica, Direzione generale patrimonio naturalistico e mare	WWF, LIPU, BirdLife, Legambiente Sicilia	If any	
Spain Bodon Blanco (Valladolid; Castilla-León)	Ayuntamiento (city council) de Bocigas	Consejería de Fomento y Medio Ambiente, Junta de Castilla y León	Ministerio para la Transición Ecológica	WWF, Ecologistas en Acción	If any	
Laguna Larga (Doñana National Park, Huelva; Andalucía)	Ayuntamiento de Almonte (city council)	Consejería de Agricultura, Ganadería, Pesca y Desarrollo Sostenible, Junta de Andalucía	Organismo Autónomo de Parques Nacionales, Ministerio para la Transición Ecológica	WWF, SEO, BirdLife, Green Peace	If any	

Scientific Community
Policy Makers
Environmental Organization
General Public

1. Core stakeholders workshop

Management schemes and outreach

2. Stakeholder network meeting



WP4



UNIVERSITÀ DEGLI STUDI DI PALERMO

International networks for the conservation of Mediterranean flora and habitats



Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

	Stakeholders			Others	
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Italy Sardinia (Pauli Murtas)	Comune di San Vero Milis	Regione Autonoma della Sardegna, Assessorato della Difesa dell'Ambiente + Agenzia regionale per la protezione dell'ambiente della Sardegna	Ministero della Transizione Ecologica, Direzione generale patrimonio naturalistico e mare	WWF, LIPU, BirdLife	
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Scientific Community
Policy Makers
Environmental Organization
General Public

1. Core stakeholders workshop

Management schemes and outreach

2. Stakeholder network meeting



3. Publication and dissemination

This research was funded by Biodiversa+, the European Biodiversity Partnership under the 2021-2022 BiodivProect joint call for research proposals, co-funded by the European Commission (GA 1010525242) and with the funding organizations Deutsche Forschungsgemeinschaft e.V. (Germany), Agencia Estatal de Investigación, Fundación Biodiversidad (Spain), Ministry of Universities and Research (Italy), Österreichischer Wissenschaftsfonds FWF (Austria).

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IMAGE CREDIT: Adriana Arnal (left), Julian Bohner (left), Sara Calero (left), Inés Koch (right), Toni Purne (right), Angelo Trola (right), and Arne Schöber.

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Logos: Biodiversa+, European Biodiversity Partnership, DFG, FWF, MUR, etc.

WP4



UNIVERSITÀ DEGLI STUDI DI PALERMO

International networks for the conservation of Mediterranean flora and habitats



ProPartS

Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

	Stakeholders			Others		
	Local	Regional	National	Environmentalist NGOs	Private owners/Local community	Specialized Associations
Austria Neusiedler Lacken	Nationalpark Neusiedler See - Seewinkel	Amt der Burgenländischen Landesregierung, Abteilung: Ländliche Entwicklung, Agrarwesen, Natur- und Klimaschutz	Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie	WWF, Greenpeace		
Italy Sardinia (Pauli Murtas)	Comune di San Vero Miltis	Regione Autonoma della Sardegna, Assessorato della Difesa dell'Ambiente + Agenzia regionale per la protezione dell'ambiente della Sardegna	Ministero della Transizione Ecologica, Direzione generale patrimonio naturalistico e mare	WWF, LIPU, Birdlife		
Sicily (Lago di Pergusa)	Provincia Regionale di Enna (manager of the Reserve+SAC)	Regione Siciliana, Assessorato Territorio e Ambiente + Agenzia regionale per la protezione dell'ambiente della Sicilia	Ministero della Transizione Ecologica, Direzione generale patrimonio naturalistico e mare	WWF, LIPU, Birdlife, Legambiente	If any	
Spain Bodon Blanco (Valladolid; Castilla-León)	Ayuntamiento (city council) de Bocigas	Consejería de Fomento y Medio Ambiente, Junta de Castilla y León	Ministerio para la Transición Ecológica	WWF, Ecologistas en Acción	If any	
Laguna Larga (Doñana National Park, Huelva; Andalucía)	Ayuntamiento de Almonte (city council)	Consejería de Agricultura, Ganadería, Pesca y Desarrollo Sostenible, Junta de Andalucía	Organismo Autónomo de Parques Nacionales, Ministerio para la Transición Ecológica	SEO, BirdLife, Greenpeace	If any	

Scientific Community
Policy Makers
Environmental Organization
General Public

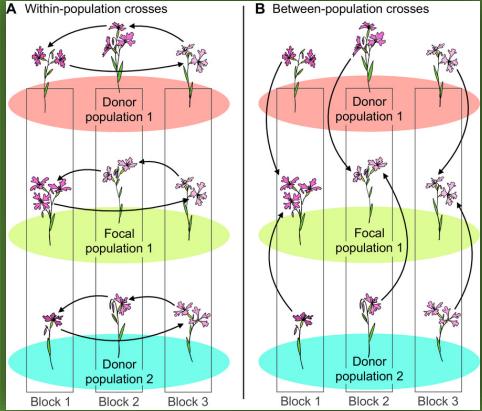
1. Core stakeholders workshop

4. Assessment of connectivity and gene flow

Management schemes and outreach

2. Stakeholder network meeting

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IMAGE CREDIT: Adriana Arnal (left), Julian Bohner (right), Sara Calvo (left), Inés Kersch (right), Tami Purne (right), Angelo Triva (right), Arne Schöer (left).

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ProPartS - Developing strategies for the protection of taxa consisting of interconnected sexual and parthenogenetic reproducing strains

WP4



International networks for the conservation of Mediterranean flora and habitats



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Scientific Community
Policy Makers
Environmental Organizations
General Public

Applicability of approaches and methodologies for other related species

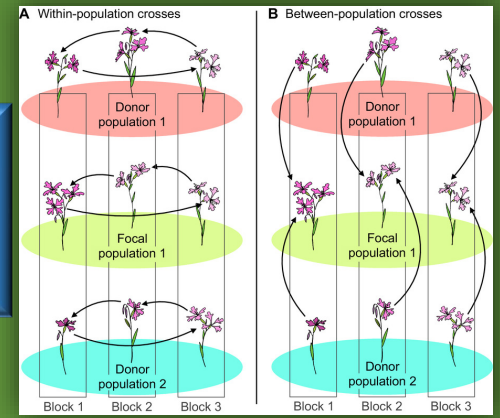
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IMAGE CREDIT: Adriana Arnal (left), Julian Bohner (left), Sara Calvo (left), Inés Kersch (right), Tati Puma (right), Angelo Triva (right), and Arne Schöor (right).

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MORE RESULTS COMING SOON



Thank you
for your
attention!

