

Sampling of plant species present in the botanical garden of Sassari to obtain high-quality molecular profiles

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Introduction

The fundamental role played by botanical gardens and parks is widely recognized in promoting and disseminating conservation, education, and public participation in relation to plant biodiversity. The Italian Botanical Society (S.B.I.) with the recent Padua Charter for Italian Botanical Gardens and Gardens, confirms their role in protecting biological diversity.

Furthermore, these structures are widely recognized for the protection they provide to endangered plant species, primarily through systematic monitoring initiatives.



Goals

This project aims to genetically characterize all species present in the garden using DNA barcoding, applying all four standard plant markers (ITS2, *rbcL*, *matK* and *trnH-psbA*). A subsequent expansion to include rare and endemic flora from north-western Sardinia. Established three years ago, the Botanical Garden of the University of Sassari currently hosts approximately 200 plant species, 10% of which are endemic.

Project actors

Botanical Garden of the University of Sassari

Institute of ZooPlantLab (Department of Biotechnology and Biosciences, University of Milano-Bicocca)

Institute of Higher Education" Nicolò Pellegrini" of Sassari.



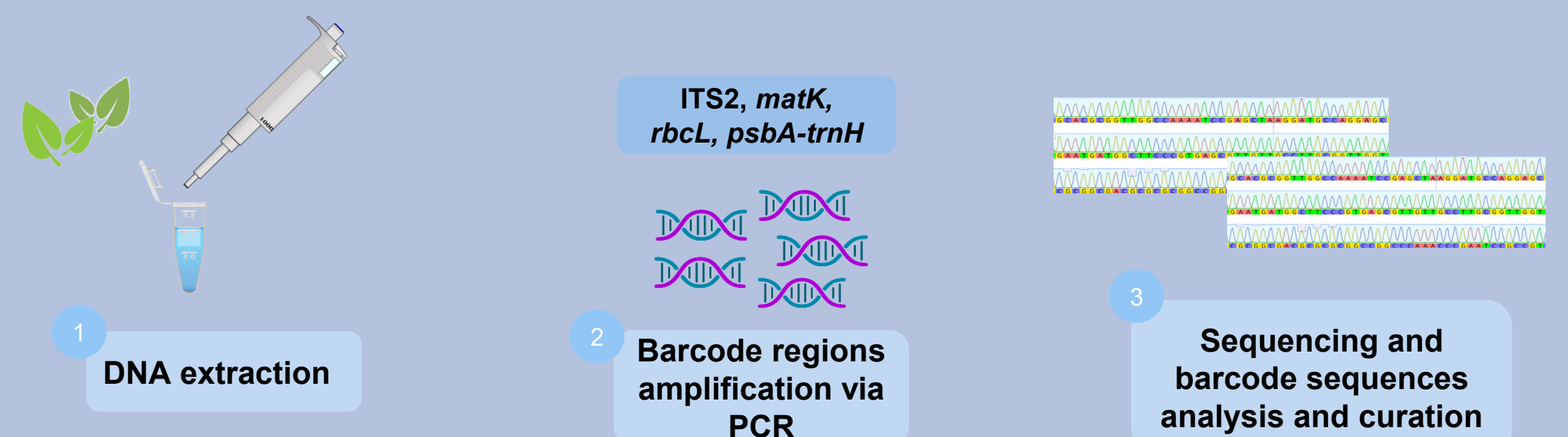
Methodology

Sampling campaign of the botanical garden flora for the creation of a genetic database



collection of fresh leaves of vascular plants

Laboratory analysis for obtaining DNA barcodes



Sequences will be deposited in BOLD and integrated into the NBFC platform

BOLDSYSTEMS

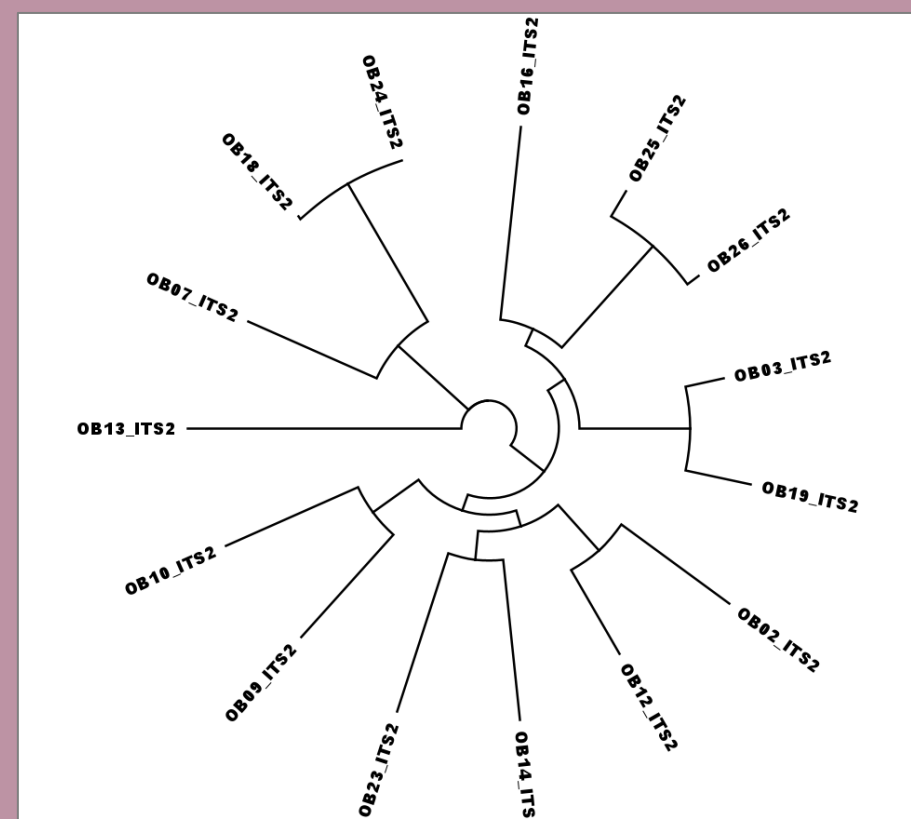


Preliminary results

ITS2 fragment length: mean 337 bp; median 348 bp; range 199–394 bp (min: OB03, max: OB09)

An unrooted Neighbor-Joining phylogram was constructed from ITS2 sequences. The tree recovers expected affinities: **OB25–OB26** (*Rhamnus*) form a tight sister pair yet remain distinct, illustrating the discriminatory power of ITS2; **OB18–OB24** (*Genista*), **OB09–OB10** (Lamiaceae), and **OB03–OB19** (Brassicaceae) also cluster as expected, while **OB13** (*Taxus baccata*) sits apart from the angiosperm samples

Notably, **9** of the 26 species analyzed produced **ITS2 sequences** that had **never been previously deposited** in public databases, representing an important contribution to the reference genetic data for the flora of north-western Sardinia and the Mediterranean region



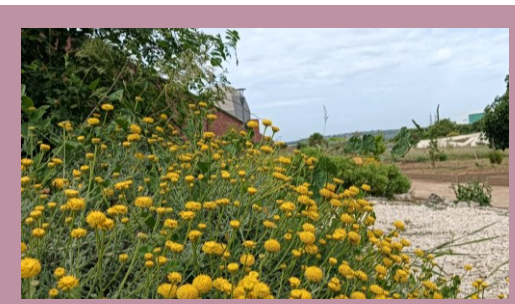
Unrooted Neighbor-Joining phylogram (ITS2), radial layout.

sample code	species	family	collection location	collection date	part of the harvested plant
01 OB UNISS	<i>Anthyllus barba-jovis</i> L.	FABACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
02 OB UNISS	<i>Centaurea horrida</i> Badaro	ASTERACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
03 OB UNISS	<i>Brassica insularis</i> Moris	BRASSICACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
04 OB UNISS	<i>Bittuminaria montisana</i> (Pignatti & Metlesics)	FABACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
05 OB UNISS	<i>Helichrysum microphyllum</i> (Willd.) Cambess. subsp. tyrrhenicum Bacch., Brullo & Giussio	ASTERACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	branch with leaves
06 OB UNISS	<i>Asphodelus ramosus</i> L. subsp. ramosus	ASPHODELACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
07 OB UNISS	<i>Astragalus terraccianoi</i> Vals.	FABACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
08 OB UNISS	<i>Asparagaceae</i>	ASPARAGACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
09 OB UNISS	<i>Thymus catharinae</i> Camarda	LAMIACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	branch with leaves
10 OB UNISS	<i>Stachys glutinosa</i> L.	LAMIACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	branch with leaves
11 OB UNISS	<i>Teucrium marum</i> L.	LAMIACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	branch with leaves
12 OB UNISS	<i>Santolina insularis</i> (Genari ex Fiori) Arrigoni	ASTERACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	branch with leaves
13 OB UNISS	<i>Taxus baccata</i> L.	TAXACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	branch with leaves
14 OB UNISS	<i>Ilex aquifolium</i> L.	AQUIFOLIACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
15 OB UNISS	<i>Ruscus aculeatus</i> L.	ASPARAGACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	Cladodes
16 OB UNISS	<i>Rosa canina</i> L.	ROSACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
17 OB UNISS	<i>Ribes multiflorum</i> Kit. ex Roem. & Schult. subsp. sandaliticum Arrigoni	GROSSULARIACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
18 OB UNISS	<i>Genista desoleana</i> Vals.	FABACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	branch with leaves
19 OB UNISS	<i>Odontarrhena tavorlae</i> (Brig.) L. Cecchi & Selvi	BRASSICACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	branch with leaves
20 OB UNISS	<i>Ephedra nebrodensis</i> Tineo ex Guss.	EPHEDRACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	branch with leaves
21 OB UNISS	<i>Sorbus aria</i> (L.) Crantz	ROSACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
22 OB UNISS	<i>Rosa serafini</i> Viv.	ROSACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
23 OB UNISS	<i>Erica scoparia</i> L. subsp. scoparia	ERICACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	branch with leaves
24 OB UNISS	<i>Genista satzmannii</i> DC.	FABACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	branch with leaves
25 OB UNISS	<i>Rhamnus alaternus</i> L. subsp. alaternus	RHAMNACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf
26 OB UNISS	<i>Rhamnus persicifolia</i> Moris	RHAMNACEAE	Orto Botanico - Sassari - Sardegna	23/10/2025	leaf

table of sampled species



Thymus catharinae Camarda



Santolina insularis (Genari ex Fiori) Arrigoni



Centaurea horrida Badaro

26 plant samples from the **Botanical Garden of the University of Sassari** have been analyzed. Among the 104 sequences we will obtain (four markers per sample), 65 (62.5%) have not previously been deposited for those species in public databases, consistent with the prevalence of endemic taxa.

At this stage, the genetic characterization has focused exclusively on the **ITS2 marker**. Although the project aims to apply all four standard plant barcoding loci (ITS2, *rbcL*, *matK*, and *trnH-psbA*), the choice to begin with ITS2 has allowed us to obtain valuable preliminary information. The ITS2 region was selected as a starting point because of its high resolution in distinguishing closely related taxa and its relevance for eDNA analyses, which will facilitate biodiversity monitoring at larger scales.