Article

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Contribution to a new vascular flora of Sardinia (Italy): II (31-60)

Abstract

Calvia, G., Ruggero, A., Fois, M., Farris, E., Lallai, A., Mascia, F., Podda, L., Campus, G., Porceddu, M. & Bacchetta, G.: Contribution to a new vascular flora of Sardinia (Italy): II (31-60). — Fl. Medit. 35: 19-50. 2025. — ISSN: 1120-4052 printed, 2240-4538 online.

Following the first contribution for a new, updated, and revised vascular flora of Sardinia, this work adds new data on the distribution of 30 taxa growing in the island. The treated taxa are both native and alien, and are characterised by their rarity, phytogeographical significance, endemicity, conservation issues, or novelty to Sardinia and Italy. These updates result from floristic research mostly conducted in South Sardinia but include several discoveries from the rest of the island. The first report of *Commelina erecta*, *Ficus watkinsiana*, *Morus kagayamae*, *Opuntia elatior* (casual alien species) in Sardinia is documented here. Additionally, *Casuarina glauca* and *Robinia* ×*ambigua*, are reported for the first time in Italy (casual alien). Moreover, the confirmation of *Ajuga chamaepitys* subsp. *chamaepitys* is here provided. Furthermore, new distributional data for 23 taxa, some of which known for their rarity, are gathered. Notably, *Elatine hexandra* and *Cosentinia vellea* subsp. *bivalens*, previously reported only once in recent years, along with *Elatine alsinastrum* and *Halopeplis amplexicaulis*, which were indicated only for a few sites. For others, an expansion or an improvement of their distribution range on the island is documented, as for rare endemics including *Artemisia campestris* subsp. *variabilis*, *Bellium crassifolium*, *Borago morisiana*, *Dianthus cyathophorus* subsp. *cyathophorus*, *Filago tyrrhenica*, *Helicodiceros muscivorus*, *Limonium racemosum*, *Phleum sardoum*, and *Torilis nemoralis*. New findings are also reported for *Asplenium sagittatum*, *Ludwigia palustris*, *Malva lusitanica*, *Mandragora autumnalis*, *Persicaria decipiens*, *Piptatherum caerulescens*, *Rorippa sylvestris* subsp. *sylvestris*, and *Veronica anagalloides* (rare or scattered native). In addition, new information on the distribution of *Artemisia verlotiorum* and *Lycium ferocissimum* (invasive alien species) is here reported. Finally, new data about some of the taxa recorded in the first contribution are added or modified.

Key words: Alien taxa, Endemic taxa, Mediterranean vascular flora, Native taxa, Rare Plants..

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Introduction

This second contribution represents a continuation of the previous work dedicated to new regional vascular plant records for the island of Sardinia (Ruggero & al. 2024).

Despite the general good knowledge on the distribution of vascular plants, previously synthesised by the work of Arrigoni (2006-2015), there are still many parts of Sardinia that in the past were not investigated. Consequently, new findings are continuously made, which enlarge the ranges of these taxa at a regional level. Often, these records are located far from the earlier studied areas of a given species, and in the meantime, distinctly broaden knowledge about its range. During field explorations across the island of Sardinia, from late 1990s to March 2025, as well as during taxonomic revisions of herbarium material of different groups of vascular plants, we also found some taxa that are new to the flora of Sardinia and, sometimes, Italy.

In this second report, we provide new records of 30 vascular plant taxa from Sardinia. These records are significant in terms of knowledge on the distribution range of these vascular plants, their endemicity and the potential/current invasiveness of some alien taxa. Particularly, six of the taxa here presented are regarded as casual alien new to the studied area, whereas other two were previously considered naturalised alien taxa, whose status has been changed to invasive. The other 22 taxa are native elements for the island, nine of which are endemic to Sardinia and, sometimes, to other islands and regions of the Tyrrhenian area, while the others can be considered rare or threatened at a regional level and have phytogeographic relevance. Furthermore, we add new reports, occurred during this last year, regarding some of the taxa treated in the previous contribution (Ruggero & al. 2024). These recent discoveries testify the importance of intensifying field surveys (Marignani & al. 2014) to have dynamic floras (Fois & al. 2022) for a better and precise comprehension of the regional floristic richness and the dynamics related to spread and invasion of alien taxa.

Material and methods

This work is based on extensive plant collections made by the authors in Sardinia and neighbouring islands and islets between 1997 and March 2025, together with a bibliographic and herbarium revision. Complementary to the field research, which has engaged the authors for years and still does, was the study of herbarium samples and extensive bibliographic material. In addition, reports from websites such as Wikiplantbase, iNaturalist or floristic pages on Facebook were considered. Plants were identified using Italian and European floras (Tutin & al. 1964-80, 1993; Pignatti 1982; Castroviejo & al. 1986-2015; Arrigoni 2006-2015; Jeanmonod & Gamisans 2013; Tison & De Foucault 2014; Pignatti & al. 2017-2019).

The status of each alien species was determined and ordered based on the criteria proposed by Richardson & al. (2000), elaborated by Pyšek & al. (2004) and reviewed according to Richardson & al. (2011). Archaeophyte and neophyte taxa were differentiated depending on their introduction before or after 1492/1500, respectively.

The list of taxa follows Pignatti & al. (2017-2019), while the nomenclature is derived from Bartolucci & al. (2024) and Galasso & al. (2024). Herbarium specimens are preserved in personal herbaria of some authors (e.g. Herbarium Ruggero, Herb. Calvia, Herb. Mascia, Herb. Farris) and in the CAG and SS herbaria. Acronyms follow Thiers (2025).

The taxa are presented in two lists, native and alien, following alphabetical order for each one. Information on ex situ conservation actions carried out for native taxa at the Sardinian Germplasm Bank (BG-SAR; Porceddu & al. 2017) is also reported.

All the cited municipalities are accompanied by their referential province code in brackets. Following the establishment of the Metropolitan City of Sassari, which occurred as a result of the Regional Law of April 12, 2021, and became officially active on April 1, 2025, the Province of Olbia-Tempio has been reconstituted under the new name of Province of Gallura (North-East Sardinia). Therefore, new province abbreviations are as follows: Cagliari is CA, Nuoro is NU, Oristano is OR, Olbia-Tempio is OT, Sassari is SS and South Sardinia is SU.

Native taxa

Ajuga chamaepitys (L.) Schreb. subsp. ***chamaepitys*** (*Lamiaceae*)

Distribution update and subspecies confirmation

New findings: Laconi (OR), Funtanamela, 700–710 m, 14/6/2018, *G. Bacchetta*, *C. Dessì* (CAG); Gadoni (NU) Foresta Corongia, area di Bauzzoni, 740–780 m s.l.m., 27/5/2023; 4/5/2024, *G. Campus* (Herb. Campus).

Observations: the presence of *Ajuga chamaepitys sensu lato* in the Italian territory is extended throughout all regions (Bartolucci & al. 2024). *A. chamaepitys* subsp. *chamaepitys* appears as the commonest subspecies throughout the distribution range of the taxon in Italy, while *A. chamaepitys* subsp. *chia* (Schreb.) Arcang. is reported as common in Sicily and nearby islands (Pignatti & al. 2017-2019) but is also present in Abruzzo, Apulia, Basilicata, Calabria, and was no longer found in Campania (Bartolucci & al. 2024). *A. chamaepitys* subsp. *suffrutescens* (Willk.) Greuter et Burdet is indicated for Sicily (Bartolucci & al. 2024).

Ajuga chamaepitys was first reported in Sardinia by Moris (1837-1859) from Mount Corrasi (Oliena, NU). Subsequently, it was only recorded a few other times, from Alghero (SS, an herbarium sample collected by Valsecchi in 1971 and preserved in SS), and Orgosolo (NU, an herbarium sample collected by Deiana in 2019 and preserved at the Supramonte Museum). A further report came from Torrente Quirra (Villaputzu, SU) by Mossa & al. (2003). Later, Arrigoni (2013) cited Lanusei (NU) mountains. All these records were done without subspecific attribution.

Here we report the presence of *A. chamaepitys* in three new stations in the territory of Gadoni (NU), falling in an approximately 1.5 km^2 area. A few plants were also found near Taccu ‘e Ticci (Seulo, NU) and Funtanamela (Laconi, OR). All the plants observed can be attributed to *A. chamaepitys* subsp. *chamaepitys* due to the width of the leaf laciniae (1–2 mm), the corolla measuring between 8 and 12 mm and the nucules with reticulated venation, of 3 × 1–1.2 mm (updated distribution in Fig. 1).

Rarity and threats: the new populations from Gadoni are quite poor in individuals, counting around 20 individuals at one station along the edges of a dirt road, and a more substantial presence (50 individuals) in other two stations was observed. Despite being quite rare on the island, this taxon is likely not facing specific threats.

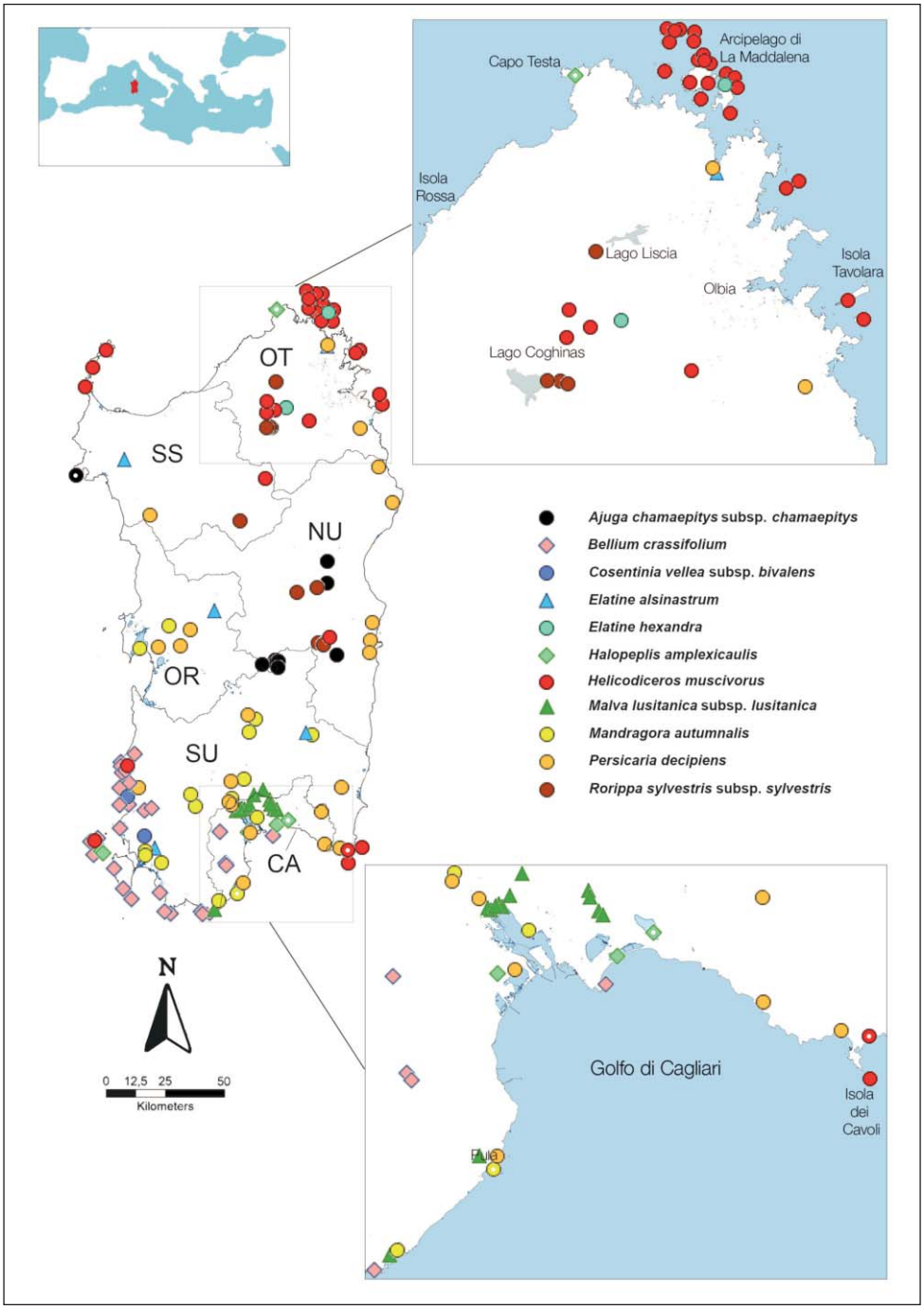

Fig. 1. Distribution map of half of the native taxa cited in this article. Pointed symbols refer to not confirmed data.

Artemisia campestris subsp. ***variabilis*** (Ten.) Greuter (*Asteraceae*)
Distribution update
New findings: Cagliari (CA) Campo di Santa Gilla, 9/2004, *B. De Martis*, *B. Mulas* (CAG); loc. Porto Canale, 0 m s.l.m., 14/2/2008, *G. Bacchetta* (CAG); Elmas (CA) loc. Is Buronàrgius, 0 m s.l.m., 02-05-2008; Uta (CA) loc. San Tommaso/Sa Tuerra, 2 m s.l.m., 28/2/2010 *F. Mascia* (Herb. Mascia); Cagliari, loc. Donna Laura, 5 m s.l.m., 20/3/2013, *F. Mascia* (Herb. Mascia); Carbonia (SU) Miniera di sterili di Serbariu, 75 m s.l.m., 5/5/2018, *G. Calvia* (Herb. Calvia); San Giovanni Suergiu/Sant'Antioco (SU) lungo la ciclabile tra Is Cordeddas e Is Loddus in diversi punti, negli incolti, 0–2 m s.l.m. 03/3/2025, *G. Calvia* (Herb. Calvia).
Observations: this taxon is considered endemic to the Tyrrhenian area, including southern Italy, Sardinia and Sicily (Pignatti & al. 2027-2019). The first report of this taxon in Sardinia was by De Marco & Mossa (1973), who documented it in their study about the flora of San Pietro Island (SU). Actually, a first collection seems to be related to an herbarium sample from Palau (OT) preserved in PI (PI-GUAD 019171; legit: M. Guadagno) and recently reported by the site Wikiplantbase. Further confirmation came from Milia & Mossa (1976), who identified it on the isthmus of Sant'Antioco (SU) and nearby areas. Despite these records, Pignatti (1982) did not include Sardinia within the distribution range of the taxon. Later, Filigheddu & Urbani (1994) clarified its distribution after discovering it in the Sassarese sector (Ossi, SS). They also reported new occurrences from the South-western part of Sardinia, namely from the surroundings of San Giovanni Suergiu (SU). More recently, we have identified it in the outskirts of Carbonia and in another area of San Giovanni Suergiu (SU), notably in fallow fields, along roadsides and on hills of mining waste materials, and around Santa Gilla Lagoon in fallow land and on scarps (Fig. 2).
Rarity and threats: the species has a restricted distribution in Sardinia, but it is locally frequent. Despite being an endemic taxon, Filigheddu & Urbani (1994), followed by Arrigoni (2015a), raised doubts about its native status in Sardinia. Although the taxon is effectively almost exclusive to secondary and disturbed environments, it can be otherwise assumed that the habitats of this taxon are particularly exposed to human pressures. Seed lots of four populations from the SAC ITB040023 "Stagno di Cagliari, Saline di Macchiareddu, Laguna di Santa Gilla" are preserved under long-term conservation at -25°C at the BG-SAR.

Asplenium sagittatum (DC.) Bange (*Aspleniaceae*)
Distribution update
New findings: Cagliari (CA) Cisterna del Tempio di Astarte, Capo Sant'Elia, 135 m s.l.m., 7/5/2000, *G. Bacchetta* (CAG); Alghero (SS) Monte Doglia, 380 m s.l.m., 15/4/2001, *G. Bacchetta*, *E. Farris* (CAG).
Observation: this circum-Mediterranean taxon is scattered along the coasts of almost all Mediterranean countries and in the islands (Pichi Sermolli 1979). It was first reported in Sardinia, sub *Scolopendrium hemionitis* Sw., *ad rupes S. Tenera, Cagliari* (cliffs of Santa Tenera, Cagliari) (Moris 1827). Later, Barbey (1884) cited Santa Teresa Gallura (a sample collected by Reverchon in 1881), Monte Santa Giusta, Nurra (a sample collected by Forsyth Major in 1884), and in a cave in Monte Argentaro, in 1883, a speci-

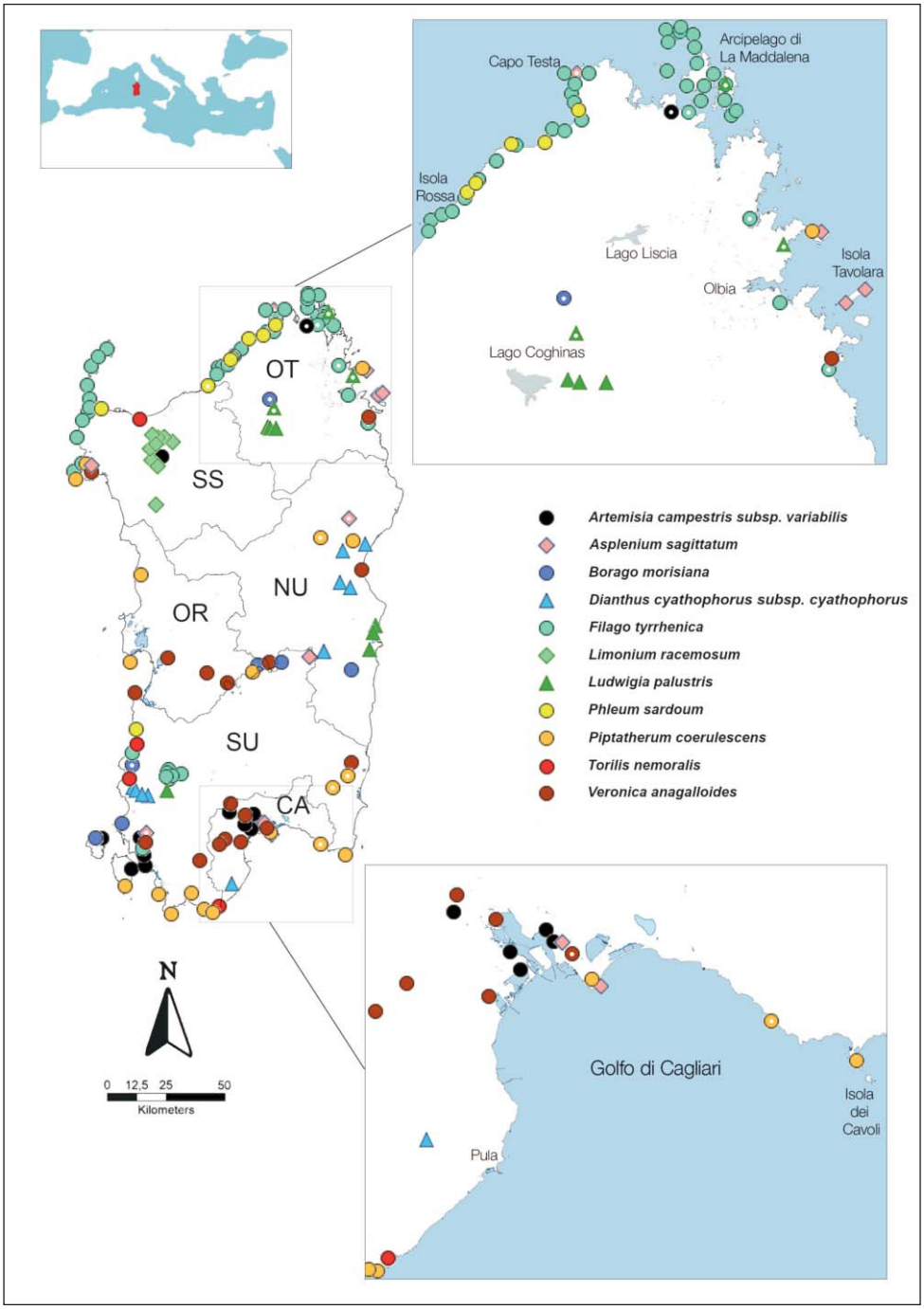

Fig. 2. Distribution map of half of the taxa species cited in this article. Pointed symbols refer to not confirmed data.

men collected by M. Major (this last site is hard to be geographically placed). Finally, he recorded it at *Grottes de Su Stiddiu, S. Avendrace, Cagliari* (samples collected by Moris and his contributors). Then, he referred that Gennari had described a var. *tenoreanum* from this last site. During the 20th century, the taxon was recorded as abundant in wet and shadowy calcareous cliffs of the northern slopes of Tavolara Island (Desole 1960). Subsequently, the species was recorded at Grotta del Diavolo (Seui, NU) and Sa Domu 'e S'Orcu (Carbonia, SU; Berta & Chiappini 1978). Then, it was also reported as very rare in the cave Conca 'e Crapa, on Monte Albo (Lula, NU; Camarda 1984), Lastly Arrigoni (2006) added Capo Figari (Golfo Aranci, OT).

An erroneous report exists from the island of Caprera: Nicotra (1896), citing a finding by Binna, recorded the doubtful occurrence of *Scolopendrium breve* Bert. The presence of this taxon on Caprera was already questioned by Vaccari (1896), then definitely excluded by Bocchieri (1996).

Few years ago, we found two new populations in the Roman cistern beside the Temple of Astarte on Capo Sant'Elia (Cagliari) and in a cave on the side of the road leading to the summit of Monte Doglia (Alghero, SS; Fig. 2).

Rarity and threats: the species in Sardinia is very rare, often giving rise to extremely small populations in limestone rocky environments and locally it has not been confirmed in recent years, as in the cave Conca 'e Crapa, where it was unsuccessfully searched for in 2022. For this reason, in situ and ex situ protection measures should be taken and the species should be assessed at a regional level using IUCN criteria (IUCN 2012).

Bellium crassifolium Moris (*Asteraceae*)

Distribution update

New findings: Buggerru (SU) San Nicolò. Calcari paleozoici; esposizione E 100°, inclinazione 100°, 150 m s.l.m., 11/6/1998, *S. Brullo*, *G. Bacchetta* (CAG); Fluminimaggiore (SU) Gutturu Pala. Calcari, esposizione NNW 350°, inclinazione 80°, bioclima meso-medit. inf./subumido sup., 6/6/2002, *G. Bacchetta*, *M. Casti*, *C. Pontecorvo* (CAG); Siliqua (CA) Sa Spindula di Monte Arcosu, 292 m s.l.m., 7/9/2021, *G. Bacchetta*; Sant'Antioco (SU) Isola della Vacca, tra le rocce a margine della gradinata semi-naturale, 28/9/2022, *F. Mascia*.

Observations: this taxon is endemic of south-western Sardinia, where it was first described by Moris (1827) at Capo Sant'Elia (Cagliari), and San Pietro Island (Cala Vinagra). Subsequently, it was found in other coastal sites, in the municipalities of Arbus, Buggerru, Carloforte, Domus de Maria, Fluminimaggiore, Iglesias (Masua), Sant'Anna Arresi, Teulada (SU; Arrigoni 1969, 1979, 2015a; Bacchetta 2006; Pontecorvo 2007). It is also present on coastal rocky areas of Gonnesa and Portoscuso (from Goroneddu to Capo Altano), and of Sant'Antioco Island (Mangiabarche, Calasetta; Capo Sperone, Sant'Antioco, SU). In smaller islands, it is also present at Tuarredda Island (Teulada) and Pan di Zucchero (Bocchieri 2001). The species thrives on rocky environments and appears to be indifferent to geological substrates, being rather frequent in volcanic, metamorphic and calcareous coastal areas. Nonetheless, it is also known from inner sites, although rarer, as in the hills of Sarroch, in the contiguous localities Is Cioffus and Bidda Mores, on metamorphic vertical cliffs (Bacchetta 2006) and at Sa Spindula waterfall in Monte Arcosu (Siliqua) on granitoids, while in meta-calcareous cliffs it grows

near Monte San Giovanni and Bindua (Iglesias), and in the area of Gutturu Pala, Arenas (Fluminimaggiore) (Arrigoni 1979; Pontecorvo 2007).

Here, we slightly enlarge the distribution of the species in the main island (Fig. 1), and we add a population on the coastal cliffs of the Vacca Island, where it was not previously reported by Bocchieri (1992).

Rarity and threats: despite being typical of coastal areas, the species grows in sites that do not face particular threats, apart from trampling and climbing, which are limited to small areas. Seed lots of six different populations are stored at BG-SAR. The oldest accession, which comprises 1283 seeds, was collected in 2007.

Borago morisiana Bigazzi & Ricceri (*Boraginaceae*)

Distribution update

New finding: Ulassai (NU) Sa Canna, 749 m s.l.m., 3/9/2023, *F. Mascia* (Herb. Mascia).

Observations: this species is a narrow endemic, which is limited to central and south-western Sardinia, where it appears to be very rare. It was described by Bigazzi & Ricceri (1992) for a single site, a rivulet close to the coast, on San Pietro Island. The authors reported other findings, especially by Moris, under *Borago laxiflora* var. *parviflora* Moris (Moris 1837-1859), which were related to an unconfirmed herbarium collection from Fluminimaggiore (Bacchetta & Pontecorvo 2005). Moreover, a few other Moris´ herbarium samples exist, some of which are mixed with *B. pygmaea*, from Tempio Pausania (OT), Ogliastra, and generic mountain areas of Sardinia (Bigazzi & Ricceri 1992). Up to now, there has been no confirmation about Tempio Pausania. In more recent times, the species has been found and reported in other localities, particularly near Laconi (OR; Bigazzi & al. 2005; Selvi & al. 2006), and along a rivulet in the locality Goroneddu (Portoscuso, SU; Mascia and Orrù 2023).

Here, we add a few new growing localities (Fig. 2), of which one confirms the old findings by Moris from Ogliastra, specifically from Ulassai (NU), while the second was in the locality Bauzzoni (Gadoni, NU; from this last no sample was collected given its rarity).

Rarity and threats: the species has been considered endangered (EN) in recent years (Orsenigo & al. 2018). Among the threats it has to face, droughts, natural evolution of the surrounding vegetation and diffusion of invasive alien plants have been recognised as the major potential causes of loss. Despite the addition of these latest findings, the species remains at great risk of extinction due to a general poor number of plants for each growing station. Ex situ actions were provided through the collection, in 2004, of 48 seeds from San Pietro Island and 26 from Laconi. These seeds are safely preserved at -25°C at BG-SAR.

Cosentinia vellea subsp. ***bivalens*** (Reichst.) Rivas Mart. (*Pteridaceae*)

Distribution update

Findings: Iglesias (SU) Falesia di Masua. Calcari paleozoici, esp. ESE 120°, inclin. 90°, biocl. termomedit. sup./secco sup., 20/4/2002, *G. Bacchetta*, *M. Casti*, *C. Pontecorvo* (CAG); Iglesias (SU) Falesia di Masua. Calcari paleozoici, 140 m s.l.m., esp. ESE; inclin. 90°, biocl. termomedit. sup./secco sup., 14/7/2006, *C. Pontecorvo*, *M. Casti* (CAG).

Observations: for a long time, this taxon was thought to be absent in Italy, with only *C. vellea* subsp. *vellea* reported, as noted by Marchetti (2004). However, the taxon has been

cited for the first time in Sardinia and Sicily by Brullo & al. (2007), who reported unpublished data from Bacchetta. While *C. vellea* subsp. *vellea* is quite widespread on metamorphic and granitic substrates, mostly in the southern half of Sardinia, the only known report up to now known for *C. vellea* subsp. *bivalens* was from Masua (Iglesias, SU), on calcareous outcrops. We also observed, although not collecting them, some plants that could be referred to this taxon on meta-calcareous outcrops near Carbonia (SU; Fig. 1).

Rarity and threats: the taxon is extremely rare on the island and is locally threatened by human activities such as climbing on the calcareous cliffs of Masua. These issues, the taxon warrants protection through both in situ and ex situ efforts. Additionally, it should be assessed at a regional level using IUCN criteria (IUCN 2012).

Dianthus cyathophorus Moris subsp. ***cyathophorus*** (*Caryophyllaceae*)

Distribution update

New findings: Domusnovas (SU) Presso la Grotta di San Giovanni, 510 m s.l.m., substrato metamorfiti paleozoiche, 4/6/2006, *G. Bacchetta*, *C. Pontecorvo* (CAG); Iglesias (SU) San Benedetto, Monte Perda, 570 m s.l.m., 14/4/2024, *G. Bacchetta*, *T. Carai*, *E. Pontecorvo* (CAG); Iglesias (SU) Perdu Carta, 768 m s.l.m., 14/4/2024, *G. Bacchetta*, *T. Carai*, *E. Pontecorvo*.

Observations: this taxon is endemic to central eastern and south-western Sardinia, where is typical of calcareous outcrops of Supramontes and Sulcis-Iglesiente (Bacchetta & al. 2010). It was first described by Moris (1837-1859) from specimens collected by Lisa on the Dorgali mountains. Then it was collected in other parts of Supramontes, in the municipalities of Oliena, Orgosolo and Urzulei. Other findings were related to Marganai (Iglesias, SU), and to the locality of Sa Pala is Arangius (Pula, SU; Bacchetta 2006). More recently, it was reported for Ogliastra calcareous outcrops (Cuena-Lombraña et al. 2023). This last report is due to a sample collected by Bacchetta in 2013 at Perd'e Liana (Gairo, NU) and preserved at the herbarium CAG.

Here, we report the discovery of new growing localities at San Giovanni (Domusnovas, SU), Monte Perda (San Benedetto, Iglesias, SU) and Perdu Carta (Iglesias; Fig. 2).

Rarity and threats: though not very rare, this taxon is threatened by constant and massive overgrazing in several of its growing stations, both by wild animals and feral livestock. Only plants growing on vertical calcareous cliffs are often left without any damage. In situ conservation measures are needed, while ex situ action was ensured through the conservation at BG-SAR of two different seed lots collected from Marganai and San Benedetto respectively. The species should be considered for a regional IUCN assessment (IUCN 2012).

Elatine alsinastrum L. (*Elatinaceae*)

Distribution update

New finding: Carbonia (SU) laghetto di Sirimagus, acque poco profonde lungo le sponde, 272 m s.l.m., 1/5/2021, *G. Calvia, A. Tatti, F. Tatti* (Herb. Calvia).

Observations: this Eurasian species has a limited distribution in Italy, where it is known from the Abruzzi, Apulia, Latium, Lombardy, Piedmont, Sardinia, and Tuscany. It is considered extinct in Sicily and its presence is doubtful in Emilia-Romagna and Umbria (Bartolucci &

al. 2024). On the island of Sardinia, the species was first reported by Barbey (1884) "*Teste Rev*[erchon] *cat. mss*.". Later, Pignatti (1982) confirmed its presence in Sardinia, though without specifying a place. Subsequently, Arrigoni (1983) excluded it from the Sardinian flora. More recently, Iiriti (2006) found it on the shores of Flumendosa River (Ballao, SU), while Desfayes (2008) observed it along Rio San Giovanni (Arzachena, OT). Some specimens, preserved in the herbarium SS, were reported on the website Wikiplantbase Sardegna for Sos Fungarones (Olmedo, SS) and Paule Longa (Ghilarza, OR).

Here, we report the discovery of a new population of this species on a small, isolated lake in the south-western Sardinia (Fig.1), where it grows in still waters, approximately 30 cm to 1 m deep, alongside other hydrophytes such as *Myriophyllum alterniflorum* DC. and *Ranunculus baudotii* Godr.

Rarity and threats: the species is very rare on the island of Sardinia. Specifically, the new population is small and is isolated within a closed water system, of supposedly Nuragic origin (1500-700 BCE), which currently serves as a water reserve for shepherds and is grazed by livestock. Both in situ and ex situ conservation measures are needed, and the species should be considered for a regional IUCN assessment (IUCN 2012).

Elatine hexandra (Lapierre) DC. (*Elatinaceae*)

Second record to Sardinia and distribution update

New finding: Isola di Caprera (SS) Fosso Stefano, rive umide bacino artificiale, 11/6/2024, *A. Ruggero*, *A. Di Giacomo* (CAG).

Observation: this species has a European-Atlantic distribution (Popiela & al. 2011; POWO 2024). In Italy, it is reported as a cryptogenic taxon growing in Lombardy, Piedmont, Emilia Romagna and Sardinia, while in Corsica it is considered native (Delage & Hugot 2020). Its presence is doubtful in Veneto and was erroneously reported in Liguria and Friuli Venezia Giulia (Bartolucci & al. 2024). In Sardinia, the taxon has been only reported from one site, Vena Limbara (Calangianus, OT), on the eastern border of Mount Limbara, in the northern part of the island (Bartolucci & al. 2022).

In this contribution, we report the occurrence of this species on the La Maddalena Archipelago (OT), near the shores of the artificial basin of Fosso Stefano, on the island of Caprera (Fig. 1).

Rarity and threats: the species is quite widespread within its range and does not need special protection measures globally. However, in Sardinia, the species is currently known from only two sites, both in semi-artificial contexts (some lakes originated from abandoned granite quarries and an artificial water basin). These two Sardinian populations should be monitored and potentially protected through in situ and ex-situ conservation efforts. In the case of Caprera, within the "Project for the conservation of plant diversity in the La Maddalena Archipelago National Park", in 2024 a germplasm collection has been gathered and preserved at the BG-SAR.

Filago tyrrhenica Chrtek & Holub (*Asteraceae*)

Distribution revision

Findings: Isola di Caprera (SS) davanti Is. Porco. Scogliera, 25/4/1997, *A. Ruggero*, *A. Di Giacomo* (Herb. Ruggero); Aglientu-Vignola (SS) M. Russu. Suolo sabbioso compatto e nudo, 26/4/1998, *A. Ruggero* (Herb. Ruggero); Trinità d'Agultu (SS) La Marinedda.

Sabbie nude e compatte tra gariga ad *Helichrysum*, 25/4/2004, *A. Ruggero* (Herb. Ruggero); Trinità d'Agultu (SS) Cala Sarraina. Sabbie compatte a margine sentieri, tra le garighe costiere, 15/4/2018, *A. Ruggero*, *A. Di Giacomo* (Herb. Ruggero); Alghero (SS) Cala Barca. Sfatticcio sabbioso, tra le garighe al limite del sentiero, 25/3/2024, *E. Farris*, *A. Maccioni* (Herb. Farris); Villacidro (SU) Punta Santu Miali, 1062 m s.l.m., 18/5/2024, *G. Bacchetta* (CAG).

Observations: this species is endemic to Sardinia and Corsica. Historically, its distribution was believed to be limited to northern Sardinia and southern Corsica (Martinoli 1958; Corrias 1977). However, in Corsica, the species is widespread along the coasts of the southern half, from Punta d'Omigna in the West, to North of Portovecchio in the East. More recently, it has been found in a single population on the northern side of the island, North of the Ostriconi dune system (Gehu & al. 1989; Delage & Hugot 2020).

In Sardinia, the species range is primarily northern, with two main populations. One stretching along the north-western coast of Nurra, from Cala Viola to Stintino (SS), including the island of Asinara (Corrias, 1977). In this north-western range, the southern limit reported by Corrias (1977) should be corrected, because a small population occupying a few square meters in the locality Cala della Barca (Capo Caccia Peninsula, Alghero, SS), was recently discovered. The second main population is located along the Gallura coasts, from the northern Badesi shores up to Capo Falcone (Santa Teresa Gallura, OT) (Corrias 1977; Ruggero 2022), including La Maddalena Archipelago, where it is quite common, and the type specimen was described (Moris 1837-1859). The taxon appears less commonly along the north-eastern coasts of Gallura, where Vaccari (1894) recorded it from a beach near Palau (OT). Then, the species was found at Le Saline Pond (Olbia, OT) by Corrias (1977), here confirmed, along with additional reports by Arrigoni (2015a) from Cugnana (Olbia) and Capo Coda Cavallo (San Teodoro, OT).

However, the taxon is also present in a few sites along the south-western coast. Corrias (1977) cited an herbarium sample preserved in FI from San Giovanni Suergiu (SU), not confirmed in recent studies, while another population was found on the island of Sant'Antioco by Gehu & al. (1989).

Interestingly, the species has been reported in unusual environments, pastures and garrigues of Monte Linas, between 800 and 1200 m a.s.l. (Genna Miratta, Beigherrus, Argiolas de Serpi, Perda de Sa Mesa, Punta Cabixettas) by Angiolino & Chiappini (1983), a finding later confirmed by Bacchetta & Pontecorvo (2005). We confirm the presence of this endemic species in almost all the previously known Sardinian locations, included the mountain population in the south-western area, where we add a new station found on the locality Santu Miali (Villacidro, SU), which is a separated part of Monte Linas. Moreover, we report new findings along the south-western coast, specifically in the municipality of Arbus (SU), between Scivu and Capo Pecora, on stabilised dunes (Fig. 2).

Rarity and threats: The species typically thrives on bare soils, in open environments with scattered vegetation, primarily in coastal areas, which may be naturally or artificially disturbed through trampling or other factors. While the taxon often occupies a limited area within individual populations, it is widespread across a large range and has been classified as "Least Concern" (LC) on the IUCN Red List (Rossi & al. 2020). However,

given its prevalently coastal localization, some populations are at potential risk of destruction due to infrastructure development related to tourism (new roads, paths, hotels, villas). Excessive trampling is a major disturbance factor, although a complete absence of trampling can sometimes lead to habitat transformation as more evolute vegetation types take over. The spread of the species may also be hindered by the presence of alien invasive taxa, such as *Acacia saligna* and *Carpobrotus* sp. pl. The ex situ conservation is ensured at BG-SAR through the preservation of three different seed lots collected in 2023 and 2024 from La Maddalena Archipelago, and one accession obtained in 2009 from San Pietro Island.

Halopeplis amplexicaulis (Vahl) Ces., Pass. & Gibelli (*Amaranthaceae*)

Distribution update

New findings: Carloforte (SU) Saline, dietro il Cimitero, fanghi umidi lungo le sponde, 0 m s.l.m., 7/6/2019, *M. Fois*, *A. Cuena*; Assèmini (CA) loc. Saline Contivecchi, superfici temporaneamente emerse ai margini delle vasche evaporanti, 6 m s.l.m., 19/8/2021, *F. Mascia* (Herb. Mascia).

Observations: this Eurasian species has a limited distribution in Italy, where it is known from Apulia (Salina Grande di Taranto), Sicily (Trapani and Isola grande dello Stagnone), and Sardinia, while the last record for Basilicata dated back to 1886 (Silletti 2012). In Sardinia, it was first reported by Barbey (1884) on samples collected by Reverchon at Santa Teresa Gallura (OT), a population no longer present today, and by Casu (1905) for the "Saline della Spiaggia di Cagliari". Later, it was reported in the Simbirizzi Pond (Onnis 1964), from which it disappeared following its transformation into a freshwater reservoir. Later, it was certainly known in a single population in the Molentargius Pond (De Martis & Mulas 2008). However, in 2019 it was reported from San Pietro Island (SU) (https://italiaiswet.it/general/report.php?code=ITG27PIE0005&lang=en; Fois & al. 2022; Cogoni & al. 2021). That report was given along the banks of the former Saline di Stato, a few hundred metres from the town centre of Carloforte. The area of this population is further expanded here, bringing back a second location along the banks of the Saline, behind the cemetery. In both cases, these are small stands of less than 50 individuals; for this reason, no samples were taken for deposit in herbaria (a picture is available on the above-mentioned website). Similarly, the finding in the Saline Contivecchi expands its range in the Gulf of Cagliari from Molentargius to Santa Gilla Lagoon (Fig. 1).

Rarity and threats: the population of Molentargius Pond is within the Molentargius-Saline Regional Nature Park. Both extant populations are located within Special Areas of Conservation (SACs ITB040027 "Isola di San Pietro", ITB040022 "Stagno di Molentargius e territori limitrofi" and ITB040023 "Stagno di Cagliari, Saline di Macchiareddu Laguna di Santa Gilla"). The species lives in specific conditions of hyperumid-alophytic muds that limit the potentially suitable conditions to few and fragmented sites. It may suffer over-trampling of waterflows, particularly by flamingos (which can be, in turn, also dispersers) and, especially in Carloforte, human-related disturbances such as land reclamation and waste disposal. In situ conservation efforts are necessary while, regarding the ex situ preservation, seven seed lots from the SAC ITB040022 are stored at the BG-SAR under long-term conservation. The species should be considered for a regional assessment under IUCN criteria (IUCN 2012).

Helicodiceros muscivorus (L.f.) Engl. (*Araceae*)

Distribution update

Findings: Pattada (SS) Sponda nord del lago di Lerno, sopra la diga. Tra le rocce (rarissimo) 600-650 m s.l.m., 20/5/2019, *G. Calvia*; Arbus (SU) Capo Pecora, anfratti tra le rocce, 6/3/2022, *G. Calvia* (georeferenced picture); Tempio Pausania (SS) Monte Limbara, Lu Fossu di Lu Pisciaroni, rocce, pietraie e scarpate, 850-900 m s.l.m., 10/9/2023, *G. Calvia* (Herb. Calvia).

Observations: *Helicodiceros muscivorus* is a western Tyrrhenian endemic species found in restricted areas of Sardinia, Corsica and the Balearic Islands (Fridlender 2000). For a long time, it was considered a coastal species, primarily associated with small islands: Stintino peninsula, La Maddalena Archipelago, Asinara, Tavolara and Molara, Cavoli and Serpentara Islands, San Pietro Island, despite a report by Veri & Bruno (1974) from Mount Limbara (Diana Corrias 1982, Arrigoni 2015b). A sample collected in 1998 near Villasimius is preserved at the herbarium CAG (Iiriti 2006). Later, it was discovered in various hilly to mountainous areas of central Corsica (Fridlender 2000), as well as inland areas of northern Sardinian, specifically on the highland between Monti and Alà dei Sardi (OT) and in two sites on Mount Limbara, in the municipality of Berchidda (Cañadas & al. 2013; Calvia & Ruggero 2020). More recently, a small population was discovered in the countryside of Villagrande Strisaili (NU; Scudu 2022). With the discoveries here reported, we have extended the species range to Monte Lerno (Pattada, SS), also confirming the initial report from Limbara by Veri & Bruno (1974) (Calvia & Ruggero 2023). In addition, we identified a new site in the coastal area of Arbus (Capo Pecora, a few plants found in March 2022) in south-western Sardinia (Fig.1).

Rarity and threats: except for some coastal sites, the species often has low population numbers and a poor reproductive rate. Generally, it grows in rocky areas that can be subject to grazing, consumption of the bulbs by wild boar, and human activities such as tourist development. In May 2024, in the Island of La Maddalena, locality Lo Strangolato, within the boundaries of the La Maddalena National Park, illegal eradication has been observed possibly due to the unpleasant odour released during flowering, or for tourist-related reasons. Locally, in situ conservation actions are necessary, while ex situ actions were ensured through seed collection and conservation of 11 different seed lots at BG-SAR. The three oldest accessions were stored in 2007, while germplasm of the newest seed lot was collected and preserved in 2024.

Limonium racemosum (Lojac.) Diana (*Plumbaginaceae*)

Distribution update

New finding: Monteleone Roccadoria (SS) pareti calcaree mioceniche all'interno della cava presso il paese, 400-420 m, 15/9/2022, *E. Farris* (Herb. Farris).

Observations: this narrow endemic species is known for the Miocene limestones surrounding Sassari and the nearby villages of Tissi and Ossi (SS), in north-western Sardinia. From this restricted area it was described (Lojacono-Pojero 1906), and even later, after detailed floristic research in the vast area occupied by Miocene limestones in northern Sardinia, no significant extensions to the species' range were added (Diana Corrias 1978; Bagella & Urbani 2006). This finding expands southwards the species' distribu-

tion (Fig. 2) and also suggests that other Miocene limestone areas in northern Sardinia could be suitable habitats for this chasmophyte.

Rarity and threats: despite Orsenigo & al. (2018) classified it as least concern (LC), it should be noted that urban expansion around Sassari is slowly eroding its range. Therefore, this new finding, increasing the known areas from one to two, greatly expands the species' extent of occurrence. However, in situ and ex situ conservation actions, and a new global assessment according to IUCN criteria (IUCN 2012) are strongly recommended.

Ludwigia palustris (L.) Elliott (*Plantaginaceae*)

Distribution update

New finding: Domusnovas (SU) Bacino di Siuru, 320 m s.l.m., 27/9/2019, *M. Fois*, *A. Cuena* (Report MedIsWet).

Observations: this species has a temperate subcosmopolitan distribution. In Italy, it has been reported in Calabria, Campania, Emilia-Romagna, Friuli-Venezia Giulia, Latium, Liguria, Lombardy, Piedmont, Sardinia, Tuscany and Veneto. It was erroneously recorded in Trentino-Alto Adige and there are no recent records from Umbria (Bartolucci & al. 2024).

Regarding Sardinia, the species was first recorded on the island of Caprera, under the binomial *Isnardia palustris* L., "along the stream near the cistern in Cala Garibaldi" (Vaccari 1894). The same author noted another record by Fiori from "Terranova (Olbia) in Golfo Aranci". A third location was later identified on Mount Limbara (Veri & Bruno 1974), with the species being found on a "forest road leading to Vallicciola". Unfortunately, the species is currently considered locally extinct in this area (Ruggero & Calvia 2014; Calvia & Ruggero 2020, 2023). Likewise, the species presence near Golfo Aranci is unconfirmed, likely due to the strong urbanization, and it has not been rediscovered at Cala Garibaldi on the island of Caprera in recent surveys. Arrigoni (2010a) described the species as "rare and in need of further searches".

However, in the last two decades, we have discovered the species at several sites along the Rio Mannu of Berchidda and Rio Badu Pedrosu (OT), confirming its presence on the Island (Ruggero & Calvia 2014; Calvia & al. 2021). More recently, three different localities were reported for Ogliastra (Rio Pramaera, Rio Girasole and Rio Foddeddu; Lotzorai, Girasole, Tortolì, NU) by Scudu (2022). Additionally, a recent find has extended its distribution to the south-western part of the island, on a small lake (https://italiaiswet.it/general/report.php?code=ITG27SAR2050&lang=en) of artificial origin near Domusnovas (SU), where it grows along the shores among the hygrophilous vegetation (Fig. 2). In this case, the population consists of less than 10 individuals; for this reason, no samples were taken for deposit in herbaria (a picture is available on the above-mentioned website).

Rarity and threats: the species is quite rare, as evidenced by its inclusion in the Red Book of Italian Plants (Conti & al. 1992). It was also listed among the "Species and habitats selected for the identification of Important Areas for Plants in Italy" (Blasi & al. 2010). In Sardinia, the distribution of the species is confined to a few wetlands, with a relatively small area of occupancy. The species faces threats from the increased frequency of extreme floods, droughts, and invasive alien species like *Procambarus clarckii* Girard,

1852, and *Myocastor coypus* Molina, 1782. Locally, it is grazed and trampled by livestock. Both in situ and ex situ conservation actions are necessary, and the species should be considered for a regional assessment under IUCN criteria (IUCN 2012).

Malva lusitanica (L.) Valdes subsp. ***lusitanica*** (*Malvaceae*)

Distribution update

Findings: Monserrato (CA) Riu Saliu, 24 m s.l.m., 11/5/2024, *G. Bacchetta*; Sestu (CA) Santa Rosa, 33 m s.l.m., 11/5/2024, *G. Bacchetta*.

Observations: this taxon has a West-Mediterranean distribution, which includes Iberian Peninsula and Sardinia (Escobar & al. 2010). In this latter island, its known distribution range was limited to the lowest Campidano and Sulcis area, including Assemini, Elmas, Monserrato, Selargius, Sestu (CA), Chia (Domus de Maria), Pula, and Serdiana (SU), for a total 13 localities (Santo & al. (2015). In these areas, the taxon grows especially in sub-salty sites near small rivulets and wet places, sometimes adapted to fallow land, ruderal sites and more rarely along small roadsides (Santo & al. 2015).

Here, we add new sites along Rio Saliu, in the stretch between the University Polyclinic (Monserrato) and the locality of Santa Rosa (Sestu; Fig. 1).

Rarity and threats: in Sardinia, the taxon is very rare and faces constant threats related to mechanical earth works for agricultural and bonification activities. Moreover, overgrazing, wildfires, pollution and, locally, tourist activities can represent other damages for the species conservation (Santo & al. 2015) For this reason, since 2008 ex situ actions have been taken through conservation of several seed lots at the BG-SAR. Nonetheless, in situ actions and a constant monitoring should be applied to preserve the species persistence on the island of Sardinia.

Mandragora autumnalis Bertol. (*Solanaceae*)

Distribution update

New findings: San Giovanni Suergiu (SU) tra Is Loccis e Medau Tracasi in loc. Craminalana. Campi incolti e margini stradali, 20 m s.l.m., 8/10/2017, *G. Calvia* (Herb. Calvia); Cabras (OR) Nasu de Canna, 2 m s.l.m., 2/11/2018, *F. Mascia*; Vallermosa (SU) loc. Is Porcilis, 114 m s.l.m., 12/10/2022, *F. Mascia*; Siliqua (SU) loc. Serra Pubusa-Zimigàrgiu, 53 m s.l.m., 24/10/2023, *F. Mascia* (Herb. Mascia); Ballao (SU) bordo strada SP23, 104 m s.l.m., 13/10/2024, *L. Podda*.

Observations: *M. autumnalis* is a South-Mediterranean species that is rare in Italy, where it is only found in the southern peninsular regions and in the islands, specifically Apulia, Basilicata, Calabria, Sardinia and Sicily. It has not been recently found in Campania, Latium, and Marche (Bartolucci & al. 2024).

In Sardinia, the species was first recorded in Decimomannu (CA), Guasila and Ussana (SU; Moris 1827), and its presence has since been confirmed based on a few herbarium specimens and reports. Therefore, it has always been considered rare on the island (Corrias & Diana 1983), with known populations limited to South Sardinia, including Campidano, Elmas (CA), Mandas, Chia (Domus de Maria, SU), and Oristanese (Atzei 2003; Bacchetta 2006; Pontecorvo & al. 2009; Arrigoni 2013). This latter author hypothesised that the species could be extinct in the island, as he did not find it during his research. However, the species still persists in some areas, particularly in the south-

western part of Sardinia, including new findings from several sites in the countryside of Ballao, Masainas, San Giovanni Suergiu, Siliqua, Vallermosa (SU) and Cabras (OR). A few plants were also observed near Nora lagoon (Pula, CA) until 2022, then disappeared. Several other reports periodically appear in social networks such as Facebook, shared by people from Siliqua (SU), Tramatza (OR), Uta (CA; Fig. 1), showing the potential usefulness of citizen science for the improvements of plants distribution knowledge (Marcenò & al. 2021).

Rarity and threats: in Sardinia, this species has populations with an area of occupancy often limited to just a few square meters. One of the primary threats to the species is its toxicity. Uninformed individuals sometimes mistake it for *Beta vulgaris* L., a naturalised plant commonly collected from fallows and roadsides, leading to cases of intoxication occasionally reported by local news. This has prompted a subsequent "witch hunt", resulting in the extirpation of local populations. Another threat comes from habitat transformation due to roadworks, construction and agricultural activities. An accession of 206 seeds, collected in 2006 from Santa Caterina (Elmas), is preserved at BG-SAR, along with three additional seed lots obtained from 25 individuals of this locality translocated at the Botanical Garden of Cagliari (Hortus Botanicus Karalitanus, HBK) in 2006 (Pontercorvo & al. 2009). Nonetheless, other in situ and ex situ conservation efforts are necessary, and the species should be considered for a regional assessment under IUCN criteria (IUCN 2012).

Persicaria decipiens (R. Br.) K. L. Wilson (*Polygonaceae*)

Distribution update

New findings: Assemini (CA) Riu Cixerri, comunità igro-nitrofile a fenologia tardo-estiva dei fanghi temporaneamente emersi, 2 m s.l.m., 18/8/2020, *F. Mascia* (Herb. Mascia); San Teodoro (SS) Rio Schifoni, letto asciutto del torrente, 113 m s.l.m., 16/9/2024, *G. Calvia* (Herb. Calvia).

Observations: this subcosmopolitan species is known across almost all peninsular Italian regions and in Piedmont, Sardinia and Sicily, but it is uncertain in Marche and Umbria (Bartolucci & al. 2024). In Sardinia, the species is quite rare. Its first mention was by Moris (1837-1859), under *Polygonum salicifolium* (non Delil.) Brousson. The author did a general report "*in fossis humidis et ad rivulorum stagnorumque margines*" (in humid ditches and along the edges of small streams and ponds). A second report was an herbarium specimen collected in 1858 near Assemini by Gennari, preserved in CAG. This locality was not confirmed by Bacchetta (2006). Another record was provided by Casu (1911), who reported it at Santa Gilla Lagoon (CA). After a long time, Iiriti (2006) added Rio Picocca (San Vito, SU) and Rio Monte Cresia (Sinnai, SU), while Pontecorvo (2007) mentioned the mouth of Riu Mannu of Fluminimaggiore (SU) , and Orrù (2007) recorded it along Riu Mannu of Siamanna (OR). Soon after, Desfayes (2008) clarified the species' distribution with more detail, reporting it in several locations: Cannigione at Madonna del Lago (Arzachena, SS), Rio Berchida (Siniscola, NU), Rio Pramaera (Lotzorai, NU), Girasole (NU), Lido di Orrì (Tortolì, NU), between Nurachi and Oristano, Tirso River near Villanova Truschedu (OR), Tuili (SU), and near Villasor (SU). Later, Arrigoni (2010a) reported it along Rio Mannu of Decimomannu (CA). More recently, the taxon was reported in the southern part of the island, along Rio Pula

(Pula, CA) by Lazzeri & al. (2015) and Riu Foxi (Villasimius, CA) by Carlo Solla (on Facebook). Two herbarium samples from Posada (NU) and Monte Minerva (Villanova Monteleone, SS) further define the range of the species in Sardinia (Fig. 1).

We have confirmed the presence of the species at Santa Gilla Lagoon and in the lower part of Rio Cixerri. Additionally, a new discovery in north-eastern Sardinia, in the municipality of San Teodoro (OT), adds more information about the known range of the species on the island.

Rarity and threats: to our knowledge, the species is scattered to a few localities, where it is often quite rare within populations. The primary threats include the increased frequency of extreme flooding events and, conversely, long periods of drought. In situ and ex situ conservation measures are necessary. A unique seed lot collected near Geremeas (Quartu Sant'Elena, CA) in 2013 is stored at BG-SAR.

Phleum sardoum (Hack.) Hack. (*Poaceae*)

Distribution update

Findings: Sassari (SS) Duna a nord dello Stagno di Pilo verso il confine comunale con Stintino. Pratelli terofitici su sabbie, 10/4/2006, *E. Farris* (Herb. Farris); Santa Teresa Gallura (SS) porzione N Rena Majore. Bassura umida in duna consolidata, 21/5/2006, *A. Ruggero*, *A. Di Giacomo* (Herb. Ruggero); Trinità d'Agultu (SS) Lu Cinoni. Duna fossile, su sabbie quasi cementate e prive di vegetazione, 5/5/2021, *A. Ruggero* (Herb. Ruggero).

Observations: *Phleum sardoum* is an exclusive endemic species of Sardinia. This species was described for the first time from the coastal areas of Rena Majore (Aglientu, OT), on the base of samples collected by Reverchon in May 1881 (Hackel, in Barbey 1884). Later, Corrias and Diana collected it in the dunes of Marina di Arbus (SU) (Camarda 1980). In these localities the species still persists. More recently, several other populations have been discovered along the Trinità d'Agultu (OT) coastline (including Lu Cinoni, near Costa Paradiso, and Cala Sarraina) as well as other localities in Aglientu (Lu Litarroni and Portobello) (Santo & al. 2013; Ruggero 2022). Arrigoni (2015b) also mentioned its presence in the countryside of Fluminimaggiore (SU). In this contribution, we report a new station from the gulf of Asinara, North to the Pilo Pond, that was firstly discovered in 2006 and later observed again in 2016 by Farris and Bacchetta. However, we were unable to confirm the population near Badesi (OT) as reported by Camarda (1995), despite extensive surveys in suitable areas (Ruggero 2022; Fig. 2).

Rarity and threats: the species thrives on compact and bare sands of dune systems and on partly consolidated sands of fossil dunes. It was listed as Critically Endangered (CR) by the IUCN Red List (Rossi & al. 2013), mainly due to its restricted range, then limited to only two growing stations, and the decline of these populations caused by significant anthropogenic pressures related to tourism. The species' preferred habitats face intense trampling, new path and road development, and invasion by alien species such as *Acacia saligna* and *Carpobrotus* sp. pl. The recent discovery of new populations in north-western Sardinia slightly improves its status, because its known locations grow from two to three, although the Rena Majore population remains in precarious condition. The previously identified threats (tourist pressure on dune systems and alien inva-

sive species) continue to persist. Ex situ actions, specifically collection and conservation of eight seed lots at BG-SAR, were undertaken for nearly all known populations.

Piptatherum coerulescens (Desf.) P.Beauv. (*Poaceae*)
Distribution update
Findings: Alghero (SS) Grotta Verde, 33 m s.l.m., 10/6/2001, *G. Bacchetta*; Sant'Anna Arresi (SU) Punta Menga, 19 m s.l.m., *F. Mascia*; Tresnuraghes (OR) Torre Foghe, su basalti costieri, 8/5/2024, *E. Farris* (Herb. Farris).
Observations: this species was firstly reported in Sardinia by Moris (1827), then confirmed by Valsecchi (1964, Capo Caccia and Calich Pond in the municipality of Alghero, SS), Pignatti (1982), Ballero & Bocchieri (1987, Capo Teulada, SU), Bacchetta (2006, Capo Spartivento, Monte Calcinaio, Tuerredda, SU) and Arrigoni (2015b). This latter author detailed its presence on the island, specifically reporting it for Alghero, Capo Figari (Golfo Aranci, OT), Mt. Ortobene (Nuoro), Oddoene (Dorgali, NU), Laconi (OR), Capo Carbonara (Villasimius, SU), Capo Sant'Elia (Cagliari), Capo Teulada (Teulada, SU), Sant'Antioco Island (SU), and Capo San Marco (Cabras, OR). The species seems to be quite frequent in the Sarrabus sector, where it was reported on different localities from the municipalities of Burcei, San Vito, Villasimius (SU), and Maracalagonis (CA; Camarda & Ballero 1981; Ortu & Marchioni Ortu 1989; Iiriti 2006). The new finding from Tresnuraghes (OR) is the first report for the area of Montiferru-Planargia and completes the species' distribution in the western Sardinian coast since it is intermediate between the two already known in Nurra (to the North) and Sinis (to the South); that from Sant'Anna Arresi completes the species' distribution in south-western Sardinia (Fig. 2).
Rarity and threats: the species is confined to a few rocky sites, mainly located in coastal environments, with few exceptions (e.g. Mt. Ortobene). The species grows on different geological substrata, including granitic (Capo Carbonara), calcareous (Capo Figari), and effusive volcanic rocks (our finding). Despite having a large extent of occurrence, its area of occupancy is small, and the species should be evaluated for a regional assessment according to IUCN criteria (IUCN 2012).

Rorippa sylvestris (L.) Besser subsp. ***sylvestris*** (*Brassicaceae*)
Distribution update
New findings: Berchidda (OT) Riu Mannu di Berchidda in loc. Silvani. Pietraie, bordi del fiume e di pozze, tamericeti, fanghi, 163-165 m, 20/6/2009, *G. Calvia* (Herb. Calvia); Fonni/Lodine (NU) Rio Govosoleo, pietraie e fanghi lungo le sponde, 23/7/2023, *G. Calvia* (Herb. Calvia); Orgosolo (NU), Pratobello, lungo un rigagnolo in secca tra la SS389 e la SP2 al bivio di Fonni, 874 m s.l.m., 7/10/2024, *G. Calvia* (Herb. Calvia).
Observations: this species was first reported in Sardinia by Valsecchi (1969), who collected herbarium samples from Rio Sa Teula in Foresta Burgos (Burgos, SS), now preserved in the SS herbarium. Later, Corrias & Diana (1983) mentioned it as a rare species in Sardinia. Ruggero (2001) further confirmed its presence on the island, having found it along Rio Carana (Luras, OT), where it still thrives today. Another confirmation came from Desfayes (2008), who recorded the species in Pratobello (Orgosolo, NU) along Rio Olai, and reaffirmed its presence at Rio Carana. Around the same period, we also

found the species along the Riu Mannu of Berchidda and near the shores of Lake Coghinas (OT). In 2018, the species was reported on the Acta plantarum forum (topic 104457) after being discovered in a stream near Villagrande Strisaili (NU). More precisely, the species is found along Rio Siccaderba and on the shores of Bau Muggeris lake (Scudu 2022). More recently, we identified it along Rio Govosoleo (Fonni-Lodine, NU) and were able to confirm the population of Orgosolo (Fig. 1).

Rarity and threats: the species is confined to a few watercourses' stretches, resulting in a relatively small area of occupancy. Its main threats include the increased frequency of extreme flooding events and, conversely, droughts. In situ and ex situ conservation measures are necessary, and the species should be evaluated for a regional assessment according to IUCN criteria (IUCN 2012).

Torilis nemoralis (Brullo) Brullo & Giusso (*Apiaceae*)

Distribution update

New finding: Porto Torres (SS) Pineta La Farrizza, 30 m s.l.m., 10/4/2023, *M. Fois*.

Observations: *T. nemoralis* was first described by Brullo in Brullo & Marcenò (1985) and therefore considered an independent species due to its distinguishable morphological characters, ecology and distribution (Brullo & Giusso del Galdo 2003). This species differs mainly from *T. nodosa* by its erect habitus, the lax inflorescence and the homocarpic achenes. In addition, while *T. nodosa* is a ruderal and nitrophilous species, widespread in many territories of Eurasia, *T. nemoralis* is confined to psammophilous coastal scrubs. After being described, it was considered endemic to Sicily until it was reported in south-western Sardinia, specifically, Chia (Pula, CA; Bacchetta 2006; Angiolini & al. 2013) and Rio Sciopadroxiu (Arbus, SU; Pontecorvo 2007). On the other hand, Arrigoni (2006-2015) considered it a synonym of *T. nodosa*. Here, we record the presence of this species in the dune system of Portixeddu (Buggerru, SU), where it was found but not collected for its rarity, in natural *Pinus pinea* formations. Moreover, we found a new population in the north-western part of Sardinia, widening its regional distribution, and suggesting its presence in other parts of the island (Fig.2).

Rarity and threats: based on current knowledge, it can be considered rare in Sardinia and possibly threatened by common pressures linked to the expansion of tourism and general coastal degradation and erosion. Nonetheless, the real distribution of this species needs further investigation.

Veronica anagalloides Guss. (*Plantaginaceae*)

Distribution update

New finding: Carbonia (SU) Mitza Saixi, pozze del ruscello, 200-240 m s.l.m., 12/4/2015, *G. Calvia* (Herb. Calvia).

Observations: this European-Mediterranean species is found in several Italian regions, except for Liguria, Piedmont, Umbria, and Val d'Aosta, where it is absent. In Marche, it is only known from historical reports, and in Trentino-Alto Adige it is currently considered extinct (Bartolucci & al. 2024). In Sardinia, the species was first reported "*in aquosis, ad rivulos et ad stagna*" (in wetlands, near streams and ponds) by Moris (1837-1859). A more precise report was provided by Barbey (1884), who mentioned its presence in Cagliari, Santa Barbara, based on a sample collected by Gennari, Ascherson and

Reinhardt. Then, Falqui (1905) recorded its presence near Capoterra (CA). Later, Landi (1934) recorded it at Calich Pond (Alghero, SS). Glück (1936) also reported the species near Oristano (OR) and Decimomannu (CA). Additional records came from Capo Frasca (Arbus, SU) (Bocchieri & Mulas 1992), from Sulcis-Iglesiente (Camarda & al. 1993, 1995) and from Flumendosa River (San Vito, SU, Iiriti 2006). Based on the available literature, this species appears rare in Sardinia, mostly concentrated in the southern half, particularly in the Sulcis area, as summarised by Bacchetta (2006). Arrigoni (2013) extended its known distribution on a few locations in the central and north-eastern parts, such as Cala Luna (Dorgali/Urzulei, NU) and San Teodoro (OT), while also recording it in other central-southern areas like Sarcidano (here confirmed at Laconi, OR), Marmilla (here confirmed at Genoni, SU and Usellus, OR), and Santa Gilla Lagoon (CA).

In our research, we were only able to partly confirm its presence at several of the mentioned sites, where the species seems to be in local decline. However, we found it in new sites, particularly in the south-western part of the island, such as in the surroundings of Carbonia (SU), along a streamlet, and near a spring on meta-limestone outcrops (Fig. 2).

Rarity and threats: the species is likely more widespread than currently recognised. Some populations appear to be robust, but threats such as prolonged droughts, heatwaves and human activities (e.g. canalization and wetlands reclamation) raise concerns about the local survival of the species. Ex situ conservation efforts are needed to address these concerns.

Alien taxa

Artemisia verlotiorum Lamotte (*Asteraceae*)

Status change from Naturalised to Invasive

Findings: Tempio Pausania (SS) M. di Deu, Limbara. Bordo ferrovia, 7/9/1997, *A. Ruggero* (Herb. Ruggero); Lodine (NU) prati e incolti ai piedi del paese (invasiva), 17/8/2023, *G. Calvia* (Herb. Calvia).

Observations: the original distribution of this species is South-East Asia, but it has since spread to most of Europe, Australia, Africa, the Middle East and South America (POWO 2024). In Italy, the species is recorded in all regions. It is considered a naturalised alien in Apulia, Basilicata, Calabria, Campania, Liguria, Sardinia, Val d'Aosta and the Republic of S. Marino, and an invasive alien in the other regions (Galasso & al. 2024).

In Sardinia, the species was first recorded by Nicotra (1897) and later by Pampanini (1933-1934) at Baddimanna (Sassari), at "Sant'Avendrace", and in the "Nursery of the Public Gardens on Viale Regina Elena" (Cagliari). These reports were then confirmed by Cobau (1940) and Chiappini (1963), who added Tempio Pausania (OT), Bolotana, and Desulo (NU). Further confirmations arrived by Viegi (1993), Bagella & Urbani (2006), and Arrigoni (2015a). A subsequent report arrived from San Gregorio (Sinnai, CA, Iiriti, 2006). Finally, Calvia & Ruggero (2020, 2023) included the species in the flora of Mount Limbara, based on numerous findings from the lower areas up to 1215 m a.s.l., which is currently the highest known altitude for the species in Sardinia. Lastly, Scudu (2022) recorded its abundance in all the lower parts of the Ogliastra former province.

Here, we confirm the presence of the species in the town and surroundings of Tempio

Pausania and Mount Limbara, where it often occupies small areas, mostly wet places, fallows, rural road and railroad margins. Furthermore, we report its presence in various localities in the municipalities of Arzachena, Berchidda, Calangianus, Monti, Oschiri (OT), Chiaramonti, Martis, Tula (SS). Moreover, we observed the species in different sites in central Sardinia, including the municipalities of Aritzo, Fonni, Gavoi, Lodine, Orani, Osini, Talana, and Tonara (NU), where it grows along roadsides, in fallows, in abandoned pastures and wet places. Furthermore, we add new reports from Monte Arci (Pau, OR), San Gavino Monreale and Sardara (SU; Fig. 3).

Invasiveness: in Sardinia, the species is likely more diffuse than here reported. It was previously considered a naturalised alien, as it appears in most of the studied locations. However, in some areas (e.g. Tempio Pausania, Lodine and Aritzo) it is exhibiting clear invasive behaviour, occupying massively even areas of tens of square meters within grasslands and fallows.

Casuarina glauca Sieber ex Spreng. (*Casuarinaceae*)

New casual taxon for the flora of Italy (Sardinia)

Finding: Quartu Sant'Elena (CA) località Foxi (39.223942°N - 9.247649°E) lungo il marciapiede della via Leonardo da Vinci (SP17), 10/7/2024, *A. Lallai* (CAG).

Observations: this taxon originates in eastern Australia but has been introduced to various countries across all continents, including Bahamas, Canary Islands, Dominican Republic, Florida, Haiti, Hawaii, India, Madeira, Mauritius, Morocco, New Zealand North, Norfolk Islands, Pakistan, Réunion, Tunisia, and Venezuela (POWO 2024).

In Sardinia, this species has been cultivated in the Cagliari area since the 19th century, though it has only recently shown signs of potential naturalization. A few saplings have been observed in the surroundings of Cagliari, specifically in the town of Quartu Sant'Elena, along roadsides not far from the planted specimens (Fig. 3). This is the first record of this species as a casual alien in Italy. Considering its invasiveness under certain conditions, most notably in the Hawaiian Archipelago and in Florida (Potgieter & al. 2013), it is essential to eradicate these plants and monitor the species closely to mitigate future invasion risks.

Commelina erecta L. (*Commelinaceae*)

New casual taxon for the flora of Sardinia

Findings: Quartu Sant'Elena (CA) (39.246708°N - 9.181778°E) via Dante lungo lo scolo del marciapiede, 7/6/2024, *G. Campus*; Quartu Sant'Elena (CA) via Marconi bordo strada (39.254233°N - 9.204418°E) 10/8/2024, *G. Campus* (Herb. Campus); Selargius (CA), via Cavour bordo strada (39.252812°N - 9.166421°E) *A. Lallai*; Cagliari (CA) Valle di Palabanda (39.222997°N - 09.112057°E) Orto Botanico di Cagliari, prati e aiuole, 39 m s.l.m., 30/5/2024, *L. Podda*, *G. Bacchetta*, *A. Lallai* (CAG).

Observations: the native range of this species includes the Americas, central and southern Africa, and the Arabian Peninsula (POWO 2024). In Italy, it is recorded as a casual alien species in Calabria and Sicily (Galasso & al. 2024). This perennial herb has fleshy and stout roots, and under ideal wet conditions, such as those in the Botanical Garden of Cagliari - HBK, can spread rapidly, warranting careful monitoring to prevent it from escaping cultivation. The individuals observed in Selargius and Quartu Sant'Elena are

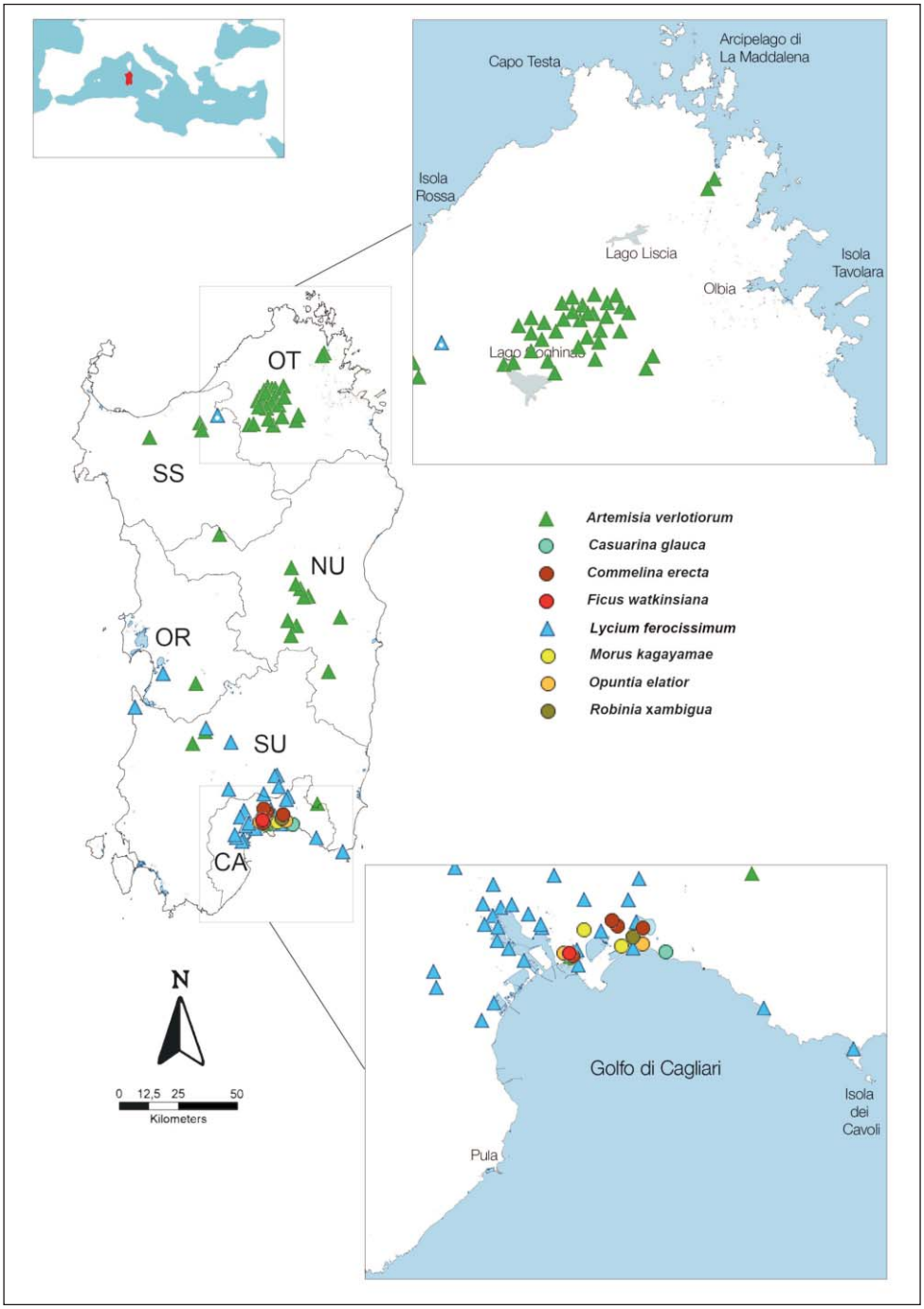

Fig. 3. Distribution map of the exotic taxa cited in this article. Pointed symbols refer to not confirmed data.

likely the result of escape from nearby gardens, where they were originally planted as ornamentals (Fig. 3).

Ficus watkinsiana F.M.Bailey (*Moraceae*)

New casual taxon for the flora of Sardinia

Findings: Cagliari (CA) Viale Sant'Ignazio. Spontaneizzata a distanza dagli individui coltivati, 38 m s.l.m., 15/10/2020, *G. Bacchetta*, *G. Lallai*, *G. Calvia* (CAG).

Observations: this eastern Australian taxon (POWO 2024) does not display a strong tendency for naturalization and is considered naturalised in Italy only in Sicily (Galasso & al. 2024).

The species was introduced in Sardinia from the 19th century for ornamental purposes and has since been used in urban landscaping in the city of Cagliari (Vannelli 1986). Recently, we observed that some plants of this species have begun growing on walls and along roads within approximately 200 m of cultivated specimens in Cagliari (Fig. 3). The fruits are consumed by pigeons (*Columba livia*, Gmelin, 1789) and monk parakeets (*Myiopsitta monachus*, Boddaert, 1783), which then disperse the seeds. The pollinator of the plant remains unknown.

Lycium ferocissimum Miers (*Solanaceae*)

Status change from Naturalised to Invasive

Findings: Elmas (CA) ex campo sportivo, 5 m s.l.m., 1/6/2018, *M. Fois*, *R. Cugusi*; Cagliari (CA) loc. S. Simone, -2 m s.l.m., 24/11/2023, *L. Podda*, *M. Fois*, *G. Bacchetta*; Villasimius (SU) presso la pineta, 3 m s.l.m., 10/2/2024, *R. Stocchino*; Cagliari (CA) Orto Botanico, Valle di Palabanda, invasiva nelle aree incolte e tra le aiuole, 52 m s.l.m., 17/6/2024, *G. Bacchetta*, *L. Podda*, *A. Lallai* (CAG); Selargius (CA) bordo strada pressi statale 554, 16 m s.l.m., 30/8/2024, *L. Podda*; Monserrato (CA) via Riu Mortu, bordo strada, 0 m s.l.m., 14/10/2024, *L. Podda*; Cagliari (CA) Anfiteatro romano, diffusa tra la vegetazione naturale, 64 m s.l.m., 26/11/2024, *L. Podda*, *A. Lallai*, *B. Gori* (CAG).

Observations: This taxon is a spiny shrub native to South Africa (POWO 2024) and reported in Italy only on Sardinia (Galasso & al. 2024). It is primarily used as a border plant (Lazzeri & al. 2013). Initially classified under the binomial *L. barbarum* (Mulas & al. 2008), it was correctly attributed and reported as invasive by Lazzeri & al. (2013). These authors specified that it thrived in many places around Santa Gilla Lagoon but was also present in several other sites within the Metropolitan City of Cagliari, and near Furtei (SU). Soon after, Zucconi & al. (2013) recorded a further locality in the Monumental Cemetery of Bonaria (Cagliari). Later, the status of this species was re-evaluated as naturalised by Galasso & al. (2018). After a few years, the populations of Santa Gilla were re-declared as invasive by Mascia & al. (2023). Nonetheless, this information was not received by Galasso & al. (2024). The species is primarily diffused in South Sardinia, where it has fast spread especially all around Santa Gilla Lagoon, as well as in other sites of Assemini, Cagliari, Capoterra, Elmas, Maracalagonis, Monserrato, Quartu Sant'Elena at Molentargius Pond (CA); Dolianova, Sardara, Serdiana, Serramanna, Soleminis and Villasimius (SU), but also in the western coast, South of Oristano and at Torre dei Corsari (Arbus, SU). A single report from North Sardinia exists, from Perfugas (SS), which needs confirmation (Fig. 3).

Invasiveness: the taxon has undergone a significant expansion in all previously recorded areas, likely facilitated by birds that consume its berries (Lazzeri & al. 2013), accelerating dispersal and posing a threat to various habitats, especially wetlands in South Sardinia, where propagule pressure is higher. Additionally, its ability to germinate under high saline concentrations and temperatures (Mayoral & al. 2020) makes it a serious invasive species for Sardinian coastal environments and throughout the Mediterranean, as it tolerates both saline and drought stress.

Morus kagayamae Koidz. (*Moraceae*)

New casual taxon for the flora of Sardinia

Findings: Quartu Sant'Elena (CA) lungo i margini del giardino della scuola dell'infanzia di via Allegri, 13/9/2023, *G. Bacchetta*, *A. Lallai*; Cagliari (CA), Parco Terramaini, ai margini delle aree coltivate all'interno del parco urbano, 15/5/2024, *A. Lallai*.

Observation: the species is native to South-East Asia and has a broad distribution range (POWO 2024). It has been recorded as an alien species in various countries across Europe, Americas and Oceania (POWO, 2024) where it was introduced for ornamental purposes. In Italy, it is reported as a casual alien species in Emilia-Romagna, Friuli-Venezia Giulia, Liguria, Lombardy, and Marche (Galasso & al. 2024).

In Sardinia, the species is rarely cultivated for ornamental purposes. Recently, we observed several young trees and saplings growing spontaneously along roadsides and in fallow areas near parks and gardens where it had been planted, with its fruits dispersing into nearby areas (Fig. 3).

Opuntia elatior Mill. (*Cactaceae*)

New casual taxon for the flora of Sardinia

Findings: Cagliari (CA) valle di Palabanda (39.222639°N - 9.110630°E) Orto Botanico, sfuggita dalla coltivazione nelle aree incolte, 51 m s.l.m., 15/7/2023, *A. Lallai*, *L. Podda*; Quartu Sant'Elena (CA) tra la vegetazione spontanea disturbata e vecchi coltivi abbandonati in aree suburbane residenziali, 9/7/2024, *A. Lallai*.

Observations: this taxon originates from central-southern America, notably in Colombia, Costa Rica, Leeward Islands, Netherlands Antilles, Panamá, Trinidad-Tobago, Venezuela, Venezuelan Antilles (POWO 2024). Due to human activity, it has been introduced to several countries on all the other continents, particularly in India and Australia (POWO 2024). In Italy, it is considered invasive in Tuscany, naturalised in Apulia, Latium, Liguria, and Sicily, while it is classified as a casual alien in Marche (Galasso & al. 2024).

In Sardinia, it was recently identified in fallow land near Quartu Sant'Elena, where it currently exhibits a slow tendency toward naturalization (Fig. 3).

Invasiveness: the species is potentially invasive, as evidenced in Tuscany (Lazzeri & al. 2018). Therefore, containment and monitoring are recommended to prevent a potential colonization of adjacent habitats.

Robinia* ×*ambigua Poir. (*Fabaceae*)

New casual taxon for the flora of Sardinia and Italy

Findings: Quartu Sant'Elena (CA) nei campi incolti adiacenti al Viale Guglielmo Marconi, 28/4/2023, *A. Lallai* (CAG).

Observations: this nothospecies, originated from the hybridization of *Robinia pseudoacacia* L. × *R. viscosa* Michx. ex Vent., occurs in the wild in North Carolina (POWO 2024). In Europe, the taxon was introduced for ornamental purposes and has now been documented as subspontaneous in parts of Eastern Europe (POWO 2024; Zieliński & al. 2015). Currently, *R.* ×*ambigua* is marketed as an ornamental species and used as a street tree. In Sardinia, this taxon is found in the town Quartu Sant'Elena, where a few specimens planted along a roadside have begun colonizing a nearby field with their suckers, which have currently developed into low shrubs (Fig. 3).

Addenda to the first contribution (1-30)

Allium sardoum Moris (*Amaryllidaceae*)

In the previous contribution we did not cite reports by Iiriti (2006) from Sarrabus (South-East Sardinia), specifically from Grommai (Maracalagonis, CA), Bruncu de Su Soli (Quartu Sant'Elena, CA) and Baccu Sa Ceraxa (Sinnai, CA). Moreover, to the previously reported localities, we add here its diffusion on the area between Posada (NU) and Siniscola (NU), both on inner and in coastal grasslands. We also report the presence of a small population in the locality Corongiu (Sinnai).

Allium savii Parl. (*Amaryllidaceae*)

A new locality, the only coastal site currently known in Sardinia, has been found at the Casaraccio Pond (Stintino, SS).

Butomus umbellatus L. (*Butomaceae*)

On the previous contribution we neglected to mention Desfayes (2008), who collected this species along Temo River (Bosa, OR), confirming the first report of Moris (1827). He also recorded it from Riu Mannu of Ozieri (SS), near the mouth of the watercourse on the Coghinas lake shores.

Cladium mariscus (L.) Pohl (*Cyperaceae*)

We found two new inner populations: one along Rio Pitrisconi (San Teodoro, OT) and one in the countryside of Benetutti (SS).

Jacobaea maritima (L.) Pelser & Meijen subsp. ***maritima*** (*Asteraceae*)

We report here its abundant presence on the promontory of Capo Testa (Santa Teresa Gallura, OT). We also add coastal areas near Cala Sarraina and a few plants around Monti di Lu Pinu, at 245 m a.s.l. (Trinità d'Agultu, OT) and in the hills of San Pantaleo (Olbia, OT) up to 400 m a.s.l.

Leersia oryzoides (L.) Sw. (*Poaceae*)

In July 2023 we found several non-flowering plants of this species along the shores of Rio Govosoleo (Fonni/Lodine, NU). Though suspecting a right recognition of the species through leaf features, we did not confirm it with certainty. Only in October 2024 were we able to come back to that site and confirm its presence there by collecting fruiting plants. This is the first record of the species out of the Coghinas river Basin.

Eragrostis curvula (Schrad.) Nees (*Poaceae*)

We confirm its presence along SS 131 D.C.N., where it was recorded in 2013, and we report a few plants along a neighbouring road, SS 129, still in the countryside of Oniferi (NU).

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