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## On the failure to find plants on some minor islands of Sardinia

### Abstract

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In the delicate ecosystem of the islands off the Sardinian coast, it often occurs that some species of plants, which were found in the past, at subsequent visits are no longer found. The author has focused his attention on 18 islands belonging to the 3 main Sardinian archipelagos, where he has taken a census of 131 entities, at one time recorded but later not confirmed by various scientists studying these habitats. These plants, which belong to 42 families and are grouped in 104 genera, are the most representative systematic categories within the Sardinian islands, belong to a floristic turnover, and have a typically Mediterranean biological and chorological spectrum. They include 10 endemisms and 9 species listed in the *Red Book of Plants in Italy*. Furthermore, it has been highlighted that the vulnerability of these environments is inversely proportional to their surface extension and the most threatened habitat is that of typically psammophilous species, followed by the casmophilous and humid habitats.

### Introduction

The research which for many years now has been under way in the fragile system of Sardinian micro-islands has allowed botanists to increase their knowledge of the plant patrimony: in fact, on the basis of the latest assessments, their floristic patrimony numbers over 1200 entities, distributed over an area exceeding 275 km<sup>2</sup> in extension. However, while on the one hand research projects have allowed us to identify plants which were not previously recorded, on the other we may observe from the floristic inventories drawn up the recurrent feature that numerous entities are not reconfirmed. These data were already found with a certain frequency in works published in the last century, for instance in Vaccari (1894) who, dealing with the plant *Helianthemum tuberaria* Mill. stated that “this species has not been found either by Gennari or by myself”; more recently, Desole (1960) reported on *Pistacia terebinthus* L.: “this is one of the taxa that I was not able to find, despite careful search”; the same researcher stated about *Armeria pungens* (Link) Hoffmanns. & Link “also this taxon was searched for carefully, to no avail”. At present, the failure to find a plant is indicated more simply with the expression: “not observed” or “not found”.

While maintaining the validity of the scientific data, which is confirmed in many

a well-defined system from a geographical point of view, and thus is well suited to this kind of observation and evaluation, the progressive reduction in number of a species within a population and its subsequent disappearance pose serious problems in the context of plant communities located in a certain area.

Thanks to the large amount of data and detailed reports on the subject, which are easily found in specialist literature, a floristic list has been drawn up with reference to 18 islands belonging to the system of Sardinian small islands, concerning the species that were reported in floristic surveys both in the distant past and more recently, and which were subsequently not found. The purpose of this list is to identify said plants and provide quantitative data, as well as allow us to make some comments and observations.

The islands listed above have an overall surface of almost 21000 ha out of a total surface of 27890 ha of the 399 islands which are scattered around the Sardinian coast (Bocchieri 1993). Said sample group includes all the categories of the scheme put forward by Arrigoni & Bocchieri (1996).

From a geological perspective also all lithological types are represented in this group, with the exception of the gneiss metamorphic rocks, which are found in Italy only in the islet of Tuarredda (Central-Southern Sardinia) which was not included in this research because of the lack of previous floristic inventories. Thus, the islands present sedimentary, eruptive, intrusive and metamorphic rock formations. Therefore, the 18 islands singled out in this research are representative of the main environmental features of the islands surrounding Sardinia, including the physical parameter pertaining to the distance from the Sardinian coastline, which ranges from the close proximity of the island of Garofani (which lies a few meters from Sardinia) to the location of the island of Toro (over 11 km off the coast of Sardinia).

With the exception of the island of Mortorio, all the other islands included in this research belong to the 3 main archipelagos of Sardinia (Maddalena, Sulcis and Tavolara). The data pertaining to the islands of La Maddalena archipelago (Maddalena, Caprera, S. Stefano, Bisce, Corcelli, Spargiotto and Barrettini) were drawn from the works by Moris (1837-1859), Gennari (1870), Vaccari (1894, 1896, 1899, 1908, 1928), Desole (1961), Corrias (1985) and Bocchieri (1995a, 1996, 1997); data on the islands of the Sulcis archipelago (S. Antioco, S. Pietro, Toro and Vacca) were obtained from the works by Pampanini & Martinoli (1946), De Marco & Mossa (1973), Milia & Mossa (1977) and Bocchieri (1990, 1992a); lastly, the information on the islands belonging to the Tavolara archipelago (Tavolara, Molara, Piana, Cavalli, Barca Sconcia and Garofani) was taken from the studies by Béguinot (1929), Béguinot & Vaccari (1927, 1929), Desole (1960), Picci (1972) and Bocchieri (1987, 1992b, 1992c). With regards to the island of Mortorio, which, together with the islands of Soffi, Camere and Poveri are to be included in the new National Park of La Maddalena Archipelago, we consulted the works of Vaccari (1928) and Bocchieri (1995b).

The above mentioned scientific studies provided us with the data needed in order to prepare the floristic list of species which were no longer found, excluding doubtful cases and instances in which current research has confirmed the existence of the plant in question. For instance, the plant *Nepeta foliosa* Moris, a Sardinian endemism which was recorded by Béguinot (1929) at Tavolara but later not confirmed by Desole (1960), has not been included in the list hereunder because, according to some researchers, this Labiate was observed in areas difficult to reach both because of the rugged terrain and because some areas are off-limits military zones. Other plants were excluded because they had been incorrectly named. This is the case of *Lavatera maritima* Gouan which was

reported on Molarotto (Lorenzoni, 1970) and on Tavolara (Desole, 1960), while a recent study ascertained it actually was *Lavatera arborea* L., as was also confirmed by Camarda & Valsecchi (1990), who excluded these two islands from the Sardinian area of diffusion of this Malvacea. Also *Armeria pungens* (Link) Hoffmanns. & Link, recorded by Moris (1837-1859) on La Maddalena and not found by Desole (1961), was recently found again by Biondi (1992). Among other plants not included in the following list we may mention: *Fumaria agraria* Lag., which is found in Sardinia exclusively in the area of the city of Cagliari and was rightly not reported by Picci (1972) on Molarata island; *Plantago amplexicaulis* Cav., which was erroneously reported as found on the Isola della Vacca; *Hieracium umbellatum* L., which the main floristic collections exclude from the Sardinian floristic repertory, in particular in the review of this genus made by Arrigoni (1987) with regards to Sardinia.

The following floristic list of species no longer found has been prepared on the basis of floristic records pertaining to the various islands up to 1929, compared with the more recent ones covering the years 1970-1995; said inventory was drawn up according to the naming and systematic order of Flora Europaea (Tutin & al. 1964-1980, 1993); a biological shape was also attributed to each entity on the basis of the behaviour of the same taxa on other islands surrounding Sardinia, the chorological shape and the island or islands in which it was no longer recorded. The signs pertaining to biological and chorological shape are those used by Pignatti (1982).

#### Floristic list

##### *Equisetaceae*

*Equisetum ramosissimum* Desf. — G rhiz - Circumbor. — S. Stefano.

##### *Adiantaceae*

*Anogramma leptophylla* (L.) Link — T caesp - Cosmop. Subtrop. — Molarata.

##### *Aspleniaceae*

*Asplenium sagittatum* (DC.) Bange — H ros - Steno Medit. — Caprera.

##### *Ephedraceae*

*Ephedra distachya* L. — NP - W Medit. — Maddalena.

##### *Fagaceae*

*Quercus calliprinos* Webb — P scap - W Medit. — S. Antioco.

##### *Urticaceae*

*Urtica urens* L. — T scap - Subcosmop. — Molarata.

*Urtica membranacea* Poiret — T scap - S Medit. — Molarata.

*Urtica pilulifera* L. — T scap - S Medit. — S. Stefano.

**Balanophoraceae**

*Cynomorium coccineum* L. — G rhiz - Medit. Turan. — Spargiotto.

**Polygonaceae**

*Polygonum robertii* Loisel. — H bienn - Europ. — S. Antioco.

*Rumex scutatus* L. — Ch suffr - Subcosmop. — Mortorio.

**Chenopodiaceae**

*Atriplex halimus* L. — P caesp - Sudafr. Steno Medit. — Vacca, Corcelli, Spargiotto.

**Caryophyllaceae**

*Stellaria pallida* (Dumort.) Piré — T scap - Paleotemp. — Toro.

*Cerastium semidecandrum* L. — T scap - Cosmop. — Piana.

*Moenchia erecta* (L.) O. Gaertner, B. Meyer & Scherb. — T scap - Submedit. Subatl. —  
Molara.

*Herniaria hirsuta* L. — T scap/H caesp - Paleotemp. — S. Stefano.

*Illecebrum verticillatum* L. — T scap - Subatl. — S. Stefano.

*Spergula arvensis* L. — T scap - Subcosmop. — Molara.

*Spergularia rubra* (L.) J. & C. Presl — Ch suffr - Subcosmop. — Toro.

*Spergularia bocconii* (Scheele) Ascherson & Graebner — T scap/H bienn -Subcosmop.  
— Molara.

*Silene velutina* Poiret — H ros - Endem. — Barrettini.

*Silene laeta* Godron — T scap - SW Medit. — Piana.

**Ranunculaceae**

*Delphinium staphisagria* L. — T scap - Steno Medit. — S. Pietro.

*Clematis cirrhosa* L. — P lian - Steno Medit. Turan. — Vacca.

*Adonis aestivalis* L. — T scap - Centro W Medit. — S. Stefano.

*Ranunculus macrophyllus* Desf — H scap - SW Medit. — S. Stefano.

*Ranunculus muricatus* L. — T scap - Euri Medit. — Cavalli.

#### *Papaveraceae*

*Papaver hybridum* L. — T scap - Medit. - Turan. — S. Stefano.

*Hypecoum procumbens* L. — T scap - Paleotemp. — S. Stefano.

*Fumaria muralis* Sonder — T scap - Subatl. — Cavalli.

*Fumaria densiflora* DC. — T scap - Subcosmop. — Vacca.

#### *Cruciferae*

*Sisymbrium polyceratium* L. — T scap - Euri Medit. — S. Antioco.

*Sisymbrium officinale* — T scap - Subcosmop. — Molara.

*Arabidopsis thaliana* (L.) Heynh. — T scap - Cosmop. — S. Stefano.

*Bunias erucago* L. — T scap - Euri Medit. — Molara.

*Capsella bursa-pastoris* (L.) Medicus — H bienn - Cosmop. — S. Stefano.

*Hymenolobus procumbens* (L.) Nutt. — H scap - Subcosmop. — S. Antioco.

*Teesdalia coronopifolia* (J. P. Bergeret) Thell. — T scap - Euri Medit. — S. Stefano.

*Rapistrum rugosum* (L.) All. — T scap - Euri Medit. — S. Stefano.

#### *Crassulaceae*

*Crassula tillaea* Lester-Garland — T scap - Submedit. Subatl. — Molara.

*Crassula vaillantii* (Willd.) Roth — T scap - Subatl. Euro Afric. — S. Pietro.

*Sedum caespitosum* (Cav.) DC. — T scap - Steno Medit. — Molara.

#### *Rosaceae*

*Aphanes arvensis* L. — T scap - Subcosmop. — S. Stefano.

#### *Leguminosae*

*Genista aetnensis* (Biv.) DC. — P caesp - Endem. — S. Antioco.

*Lupinus albus* L. — T scap - E Medit. — S. Stefano.

*Biserrula pelecinus* L. — T scap - Steno Medit. — Molara.

*Vicia villosa* Roth subsp. *varia* (Host) Corb. — T scap - Euri Medit. — Molara.

*Vicia lutea* L. — T scap - Euri Medit. — S. Stefano.

*Lathyrus cicera* L. — T scap - Euri Medit. — S. Stefano.

*Lathyrus hirsutus* L. — T scap - Euri Medit. — S. Stefano.

*Trifolium suffocatum* L. — T scap - Steno Medit. — Molara.

*Trifolium resupinatum* L. — T rept/H rept - Paleotemp — Molara.

*Trifolium striatum* L. — T scap - Paleotemp. — S. Pietro.

*Trifolium ligusticum* Balbis — T scap - Steno Medit. — S. Pietro.

*Trifolium lappaceum* — T scap - Euri Medit. — S. Pietro.

*Trifolium cherleri* L. — T scap - Euri Medit. — Molara.

*Trifolium squamosum* L. — T scap - Euri Medit. — S. Pietro.

#### *Geraniaceae*

*Geranium pusillum* L. — T scap - Europeo W Asiat. — Toro.

*Erodium malacoides* (L.) L'Hér. — T scap/H bienn - Medit. Macaron. — Molara.

*Erodium moschatum* (L.) L'Hér. — T scap/H bienn - Euri Medit. — Molara.

#### *Euphorbiaceae*

*Euphorbia dendroides* L. — NP - Steno Medit. Macaron. — S. Stefano.

*Euphorbia paralias* L. — Ch frut - Euri Medit. Atl. — S. Stefano.

#### *Rutaceae*

*Ruta chalepensis* L. — Ch suffr - S Medit. — S. Stefano.

#### *Anacardiaceae*

*Pistacia terebinthus* L. — P caesp - Euri Medit. — Tavolara.

**Malvaceae**

*Lavatera triloba* L. subsp. *pallescens* (Moris) Nyman — NP - Endem. — S. Pietro.

**Lythraceae**

*Lythrum tribracteatum* L. — T scap - Euri Medit. — S. Pietro.

**Umbelliferae**

*Eryngium barrelieri* Boiss. — H bienn/T scap - S Medit. — S. Antioco.

*Oenanthe lisae* Moris — H scap - Endem. — Maddalena.

*Foeniculum vulgare* Miller subsp. *piperitum* (Ucria) Coutinho — H scap - S Medit. — Cavalli.

*Elaeoselinum asclepium* (L.) Bertol. subsp. *meoides* (Desf.) Fiori — H scap - Steno Medit. — S. Stefano.

*Pseudorlaya pumila* (L.) Grande — T scap - Steno Medit. — S. Stefano.

**Plumbaginaceae**

*Armeria pungens* (Link) Hoffmanns. & Link — Ch frut - SW Europ. — Garofani, Tavolara.

*Limonium vulgare* Miller — Ch frut/H ros - Euri Medit. — S. Antioco.

**Gentianaceae**

*Centaurium pulchellum* (Swartz) Druce — T scap - Paleotemp. — S. Stefano.

**Asclepiadaceae**

*Gomphocarpus fruticosus* (L.) Aiton — P caesp - Sudafr. — S. Pietro.

**Rubiaceae**

*Galium verrucosum* Hudson — T scap - Steno Medit. — S. Stefano.

*Rubia pererina* L. — P lian - Steno Medit. Macaron. — Vacca.

**Convolvulaceae**

*Calystegia soldanella* (L.) R. Br. — G rhiz - Cosmop. — Bisce.

**Boraginaceae**

*Heliotropium supinum* L. — T scap - Paleosubtrop. — S. Pietro.

*Alkanna lutea* DC. — T scap - W Medit. (End. ?) — S. Antioco.

*Anchusa crispa* Viv. — H bienn - Endem. — S. Pietro.

*Myosotis arvensis* (L.) Hill — T scap - Europ. W Asiat. — Toro.

**Verbenaceae**

*Verbena officinalis* L. — H scap - Cosmop. — S. Stefano.

**Labiatae**

*Teucrium massiliense* L. — Ch suffr - Steno Medit. occid. — Maddalena.

*Teucrium polium* L. subsp. *capitatum* (L.) Arcangeli — Ch suffr - Steno Medit. — S. Stefano.

*Stachys corsica* Pers. — H rept - Endem. — S. Stefano.

**Scrophulariaceae**

*Linaria pelisseriana* (L.) Miller — T scap - Medit. Atl. — Cavalli.

*Veronica cymbalaria* Bodard — T scap - Euri Medit. — S. Stefano.

**Globulariaceae**

*Globularia alypum* — Ch frut/NP - Steno Medit. — S. Antioco, S. Pietro.

**Campanulaceae**

*Legousia speculum-veneris* (L.) Chaix — T scap - Euri Medit. — S. Pietro.

**Compositae**

*Inula conyza* DC. — H bienn - Medieuropeo W Asiat. — Cavalli, Molar.

*Anthemis maritima* L. — H scap - W Medit. — Bisce.

*Anthemis cotula* L. — T scap - Euri Medit. — S. Stefano.

*Chamaemelum fuscatum* (Brot.) Vasc. — T scap - W Medit. — Molar.

*Otanthus maritimus* (L.) Hoffmanns. & Link — Ch suffr - Medit. Atl. — Bisce.



*Chrysanthemum coronarium* L. — T scap - Steno Medit. — Molar.

*Nananthea perpusilla* (Loisel.) DC. — T scap - Endem. — Mortorio.

*Artemisia arborescens* L. — NP/P caesp - S Medit. — S. Stefano.

*Carlina lanata* L. — T scap - Steno Medit. — Bisce.

*Carduus fasciculiflorus* Viv. — H bienn - Endem. — S. Pietro.

*Ptilostemon casabonae* (L.) W. Greuter — Ch suffr/H scap - Endem. — Cavalli.

*Scolymus maculatus* L. — T scap - S Medit. — S. Stefano.

*Hypochoeris radicata* L. — H ros - Europ. Caucas. — Molar.

*Leontodon tuberosus* L. — H ros - Steno Medit. — Molar.

*Aetheorhiza bulbosa* (L.) Cass. — G bulb - Steno Medit. — Vacca.

#### *Ruppiaceae*

*Ruppia maritima* L. — I rad - Cosmop. — S. Stefano.

#### *Liliaceae*

*Ornithogalum arabicum* L. — G bulb - S Medit. — S. Pietro.

*Allium roseum* L. — G bulb - Steno Medit. — S. Stefano.

*Allium chamaemoly* L. — G bulb - Steno Medit. — S. Stefano.

#### *Amaryllidaceae*

*Pancratium maritimum* L. — G bulb - Steno Medit. — Vacca.

*Pancratium illyricum* L. — G bulb - Endem. — Bisce.

#### *Iridaceae*

*Romulea ramiflora* Ten. — G bulb - Steno Medit. Macaron. — Molar.

*Romulea columnae* Sebastiani & Mauri — G bulb - Steno Medit. — Piana.

#### *Gramineae*

*Lolium perenne* L. — H caesp - Circumbor. — S. Stefano.

- Vulpia ciliata* Dumort. — T caesp - Euri Medit. — S. Stefano.
- Poa annua* L. — T caesp - Cosmop. — Molara.
- Glyceria plicata* (Fries) Fries — G rhiz/I rad - Subcosmop. — Piana.
- Bromus diandrus* Roth — T scap - Euri Medit. — S. Antioco, Piana.
- Bromus rubens* L. — T scap - S Medit. Turan. — S. Antioco, S. Pietro.
- Bromus alopecuroides* Poiret — T scap - Steno Medit. — S. Antioco.
- Elymus repens* (L.) Gould — G rhiz - Circumbor. — Bisce.
- Avena barbata* Pott — T scap - Euri Medit. Turan. — Molara.
- Lophochloa cristata* (L.) Hyl. — T scap - Subcosmop. — Molara.
- Aira cupaniana* Guss. — T scap - Steno Medit. occid. — Molara.
- Aeluropus littoralis* (Gouan) Parl. — G rhiz - N Medit. Turan. — Barca Sconcia.

#### *Cyperaceae*

- Eleocharis palustris* (L.) Roemer & Schultes — G rhiz - Subcosmop. — Piana.
- Schoenus ferrugineus* L. — H caesp - Europ. — S. Pietro.
- Carex distachya* Desf. — H caesp - Steno Medit. — Molara.
- Carex stenophylla* Wahlenb. — G rhiz - S E Europ. S Sib. — Cavalli, Piana, Molara.
- Carex flacca* Schreber subsp. *serrulata* (Biv.) W. Greuter — G rhiz - Europ. — Piana.

#### *Orchidaceae*

- Orchis papilionacea* L. — G bulb - Euri Medit. — Molara.

#### Conclusions

The analysis of the floristic list enables us to state that within the 18 islands under consideration as many as 131 entities, belonging to 42 families and distributed in 104 genera, were no longer found. This is a significant number of species, the presence of which has not been confirmed by the latest floristic investigations and various herborizations. This fact is highly relevant since while a percentage of said species may belong to floristic turnover, as was suggested by Arrigoni & Bocchieri (1996), most of the others are gradually being reduced in number to the point of being no longer found, leading us to advance the hypothesis that they might have disappeared. In fact, while

some species belonging to the families of the *Urticaceae*, *Caryophyllaceae*, *Papaveraceae*, *Compositae* and *Gramineae* could be alternatively present on the island included in this study, or possibly on other islands, the same does not apply either to endemic species or to those species which were unsuccessfully searched for already in the past century.

The floristic inventory allows us to make the following observations. Firstly, we may note that almost all the species under consideration were not retrieved on one island only, and that the same plant was not reconfirmed in no more than 3 islands.

Among these we may mention *Atriplex halimus* L., which is widely present in Sardinia along the coasts and in many marshes, reported at la Vacca by Pampanini & Martinoli (1946) and considered "extremely common" by Vaccari (1896) at Corcelli and Spargiotto; we can state with certainty that it has now disappeared from both of these islands.

Of particular significance are the percentile variations in biological varieties of the plants no longer found and attributed according to the behaviour of the same observed on other Sardinian islands.

In fact, while on each island no correlation exists between the biological spectrum of the recorded flora with that of flora no longer found, we may notice that if we elaborate the spectrum with reference to the 131 species, we obtain a typically Mediterranean biological spectrum which is wholly similar to that of other islands surrounding Sardinia (Table 1).

Table 1. Biological spectrum and numerical and percentile distribution referred to the 135 species not retrieved (T = Terophytes; G = Geophytes; H = Hemicriptophytes; Ch = Chamaephytes; P = Phanerophytes; I = Hydrophytes).

Biol. form	No. taxa	%	Biol. Form	No. taxa	%
<b>T</b>	<b>67</b>	<b>51.5</b>	<b>H</b>	<b>23</b>	<b>17.7</b>
T caesp	3	2.8	H caesp	3	12.6
T rept	1	1.4	H rept	1	4.4
T scap	63	95.8	H scap	7	33.2
			H ros	4	16.6
			H bienn	8	33.2
<b>Ch</b>	<b>11</b>	<b>8.1</b>	<b>G</b>	<b>18</b>	<b>13.2</b>
Ch suffr	7	63.6	G bulb	9	50.0
Ch frut	4	36.4	G rhiz	9	50.0
<b>P</b>	<b>11</b>	<b>8.8</b>	<b>I</b>	<b>1</b>	<b>0.7</b>
NP	4	36.4	I rad	1	100
P caesp	4	36.4			
P scap	1	9.1			
P lian	2	18.2			

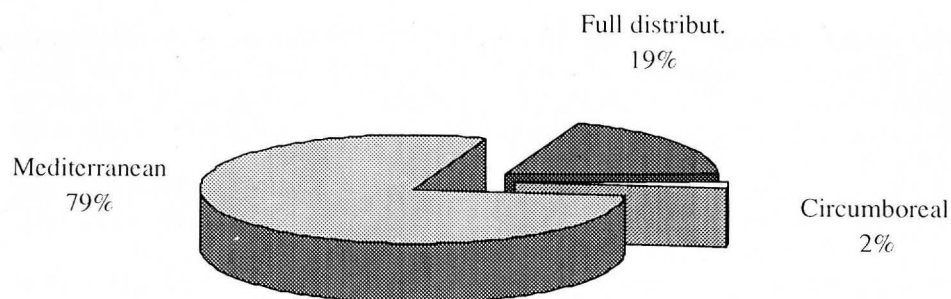


Fig. 1. General chorological spectrum.

Also with regards to chorological aspects we may state that the overall chorological spectrum (Fig. 1) and the spectrum referred to the Mediterranean component of the subelements (Fig. 2) are wholly similar to others which were elaborated on the Sardinian micro-island environments (De Marco & Mossa 1973, Milia & Mossa 1977).

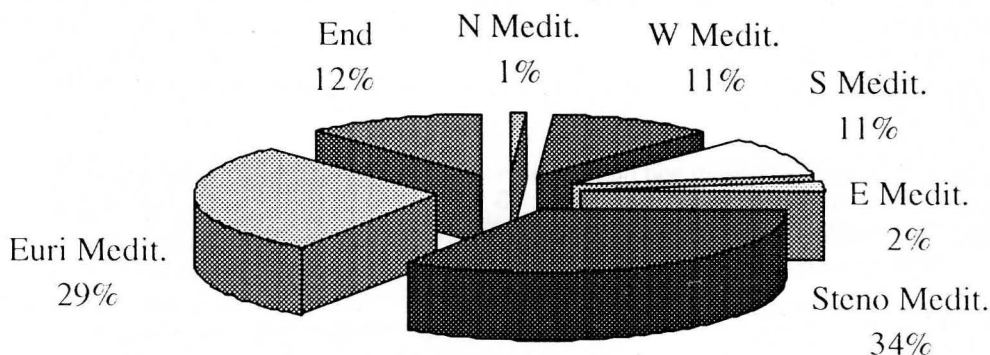


Fig. 2. Chorological spectrum of Mediterranean subelements.

But the floristic list allows us to make also another observation: in fact the most numerous families, genera and species which characterise the present plant cover of the islands around Sardinia represent the same most consistent systematic categories with regards to the plants no longer found.

In Table 2 the 131 species no longer found are grouped according to the three archipelagos under enquiry; it is quite obvious that in the Sulcis archipelago, which covers by far the largest surface, the number of species no longer retrieved is lower than in the others.

Table 2. Number of species (distributed among the various families and included in the different genera) not retrieved within the 3 archipelagos under enquiry. The surface refers to the islands included in the study.

Archipelago	Families	Genera	Species	Surface (ha)
Sulcis	24	32	36	15935.0120
Maddalena	27	45	50	3971.1134
Tavolara	17	36	46	960.7873

This fact is further highlighted if we use the classification suggested by Arrigoni & Bocchieri (1996), on the basis of which the islands are arranged according to their surface area: in fact, on the islands listed as large (over 1500 ha), which amount to an overall surface area of 20112.0922 ha, 36 species were no longer found, while in the remaining surface, amounting to less than 900 ha the plants not retrieved were almost 100 (Table 3). This may be explained by the fact that when we have larger surface areas the same type of habitat can be found in different parts of the island, while over limited surface areas a given species may have a single habitat.

Table 3. Number of taxa not retrieved presented according to surface area.

	Number of taxa not retrieved	Surface area
Large islands (S. Antioco, S. Pietro, Caprera Maddalena, Tavolara)	35	20112.0922
Other islands	96	811.4244

This is the case for instance for sandy coasts, which on certain islands are limited to a single bay, where for one reason or another psammophilous species which had their habitat in that area disappear.

This fact is particularly important in that it highlights the fragility of these ecosystems and it further stresses the fact that their vulnerability is in inverse ratio to their surface extension. Island environments are natural laboratories where it is possible to study the phenomena of dissemination migration and plant population dynamics (Greuter 1995); therefore they are particularly important and they must be protected by regulating their use, also in consideration of the fact that on these 18 islands no less than 10 endemic species were not reconfirmed (Table 4). Moreover, if we look up in the *Red Book of Plants of Italy* (Conti, Manzi & Pedrotti 1992) the species no longer found on the 18 islands under enquiry, we will find that *Polygonum robertii* Loisel. and *Silene velutina* Poiret are listed as species threatened by extinction, while *Anchusa crispa* Viv., *Armeria pungens* (Link) Hoffmanns. & Link, *Asplenium sagittatum* (DC.) Bange, *Carex stenophylla* Walenb., *Cynomorium coccineum* L., *Ephedra distachya* L. and *Nananthea perpusilla* (Loisel.) DC. belong to the group of species indicated as vulnerable. More plants will be inserted in this group unless the causes which are bringing about their disappearance from these habitat are eliminated or curtailed.

Table 4. Endemic taxa not retrieved and their distribution (AT = Tuscan Archipelago; CO = Corsica, HY = islands of Hyères, SA = Sardinia, SI = Sicily).

Taxa	Distribution
<i>Anchusa crispa</i> Viv.	SA-CO
<i>Carduus fasciculiflorus</i> Viv.	SA-CO-AT
<i>Gensita aetnensis</i> (Biv.) DC.	SA-SI
<i>Lavatera triloba</i> L. subsp. <i>pallescens</i> (Moris) Nyman	SA
<i>Nananthea perpusilla</i> (Loisel.) DC.	SA-CO
<i>Oenanthe lisae</i> Moris	SA
<i>Pancratium illyricum</i> L.	SA-CO-AT
<i>Ptilostemon casabonae</i> (L.) W. Greuter	SA-CO-AT-HY
<i>Silene velutina</i> Poiret	SA-CO
<i>Stachys corsica</i> Pers.	SA-CO

At the conclusion of this report, we find it interesting to note that once again, the most sensitive habitat which is most susceptible to modifications is the sandy habitat. In fact, the intense, albeit brief overrunning which occurs every summer in the tourist season, with the erosion processes caused by wave swell and tides, both natural and provoked by boats and other crafts, and the notable build-up of various materials which are constantly thrown onto the shore by the sea, are the causes leading to the ever increasing reduction in the number of the psammophilous species which gradually diminish and ultimately disappear.

Unfortunately, casmophilous species, which until recently seemed not to be at risk, have also started to undergo serious reductions; in fact, oil residue, which is more and more abundant in our seas deposits in cracks in the rocks thus affecting the plants' normal life cycle.

The failed retrieval of some plants, such as *Adonis aestivalis*, *Legousia speculum-veneris*, *Lupinus albus*, is to be attributed to a change in land use which has also affected small islands. It is the case for instance of the island of S. Stefano where, after the forced dispossession which took place 30 years ago, the farming practices that once extended over most of the island were abandoned.

Coastal wetlands have also undergone deep alteration, as is witnessed by the failed retrieval, in some islands of the Tavolara archipelago, of *Eleocharis palustris* and *Aeluropus littoralis*, species which are typically found in wetland environments and which were reported by Béguinot in 1928.

The islands scattered around the Sardinian coast, which up until recent times seemed to have been exempt from the alterations deriving from human activities, are slowly following the same destiny of the nearby Sardinian coasts. Therefore, with the aim of avoiding the final disappearance of numerous plants from the small islands around Sardinia, in particular rare plants or even plant retrieved in single examples (*Erica multiflora*, *Ornithogalum arabicum*, *Limoniastrum monopetalum* and many others), it would be advisable to take action with repopulation methods and systems, as is in progress for instance in some nature parks in Corsica (Guyot & Muracciole 1995, Olivier & Hernandez Bermejo 1995).

Said actions should be implemented gradually and be constantly monitored, with the aim of favouring the rooting among vegetation which in the meantime has undergone more or less deep modifications.

Finally, we must point out that this paper does not presume to be an exhaustive report on the serious and delicate issue of the failed finding or the extinction of a plant on a given island. In fact, we need to continue carrying out careful observations also on the basis of the potential for dispersal which numerous plants show, which favours floristic turnover and consequently their real possibility of regaining ground in a given area. Repeated surveys performed over several years on the islands which are the subject of this study have allowed us to observe a number of plant species which while disappearing from one territory, have colonised other areas.

These observations will be of critical importance in the attempt to define the presence or absence of a plant; in particular they will allow us to assess the time needed by a species to re-conquer a specific territory, with regards to factors of distance, environmental modification caused by human activity, plant competitiveness and their capacity to establish themselves in a territory. In fact, this work could be the first in a series of observations aimed at identifying fluctuations in floristic elements.

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