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Contribution to the knowledge of the endemic vascular flora of Sulcis (SW Sardinia - Italy)

Abstract

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The results of a survey on the endemic vascular flora of Sulcis (SW Sardinia) are presented. This flora consists of 122 taxa, including 81 species, 32 subspecies, 5 varieties and 4 hybrids. The total of 80 genera, 34 families and 23 orders are represented. The analysis of biologic and chorological data highlighted the environmental peculiarities of Sulcis, given by the local evolution of a rich floristic contingent. Eight exclusive endemics, together with an unique blend of geolithologic, geomorphologic, paleogeographic, bioclimatic and vegetation features, let to attribute the rank of biogeographic sector to the Sulcis-Iglesiente territory, whose southern part can be seen as the Sulcis sub sector. The new IUCN protection categories are proposed for all taxa restricted to the Sulcis-Iglesiente sector.

Introduction

This study arose in the frame of ten years-researches about the flora and vegetation of the relief of Southern Sardinia. During these researches, particular attention was paid to the endemic entities.

Due to the isolation and the noteworthy ecosystem diversity, Sardinia is rich in endemic taxa, particularly on its mountains, as an effect of the orophytism. The mountains of Sardinia, even if lower than the Corsican ones, and without any trace of the past glaciations, are high enough to host ecological niches that are absent in the lower bioclimatic belts. The ecologic isolation, together with the insularity of Sardinia is therefore responsible for an hot spot effect (Médail & Quézel 1997) that becomes particularly strong on carbonate massifs.

From the botanical viewpoint, the relief of Sulcis is one of the most interesting and less studied of Sardinia. The relatively few floristic studies focussed on this area, and many of them date back to the last fifteen years. As concerns the endemic vascular flora, it must be mentioned the important monograph about the endemic plants of Sardinia by Arrigoni & al. (1977-1991) and, more recently, several papers on the description of new endemic taxa (Brullo 1993; Brullo & De Marco 1995; Arrigoni & Diana 1999; Bacchetta & Brullo 2000; Bacchetta & al. 2003a) or to a better definition of their chorology (Scrugli 1992; Bacchetta & al. 2003b; Bacchetta & al. 2004).

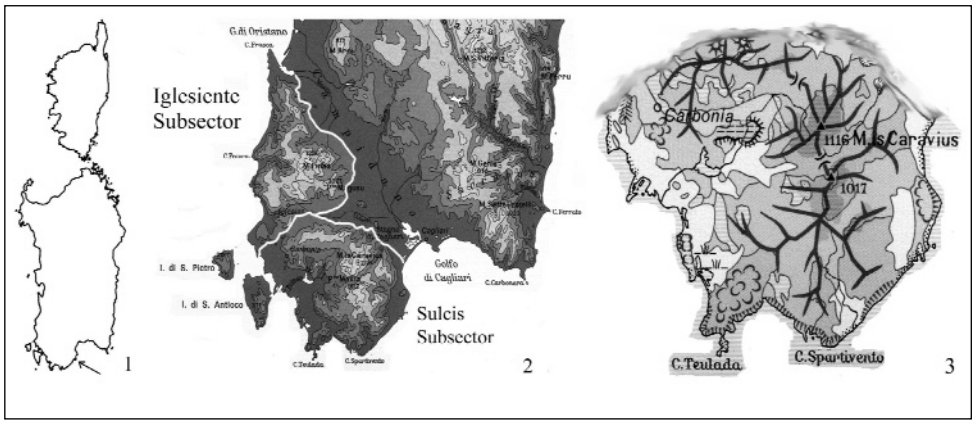
Study Area

The Sulcis-Iglesiente territory (Fig. 1-3), forming the SW part of Sardinia, is a geologic complex cut off from the rest of the island by the Graben of Campidano. The Graben of Cixerri separates on its turn the Sulcis massif, to the south, from Iglesiente, to the north. The former, having a somewhat pentagonal shape, extends approx. over 2130 km^2; the latter, having a triangular shape, covers an area of about 1225 km^2.

Sulcis-Iglesiente includes the oldest geologic units of the island: those of Bithia, Mt. Filau and Mt. Settiballas date probably back to the Precambrian (Carmignani & al. 2001). A large part of the area (about 750 km^2) is formed by the Palaeozoic units of Cabitza, Gonnesa and Nebida, consisting of sedimentary or metamorphic outcrops of carbonate rocks, aged to the Cambrian and partially emerged since the Ordovician. Further units, exclusively found in Sulcis-Iglesiente, are the metamorphites of Puddinga and Monte Argentu, in Iglesiente, and the ortogneiss forming Capo Spartivento, in Sulcis, whose formation dates back to the Ordovician. All the mentioned units rest on the Sardo-Corsican Ercinic batholite, made up by intrusive volcanic rocks of different origin and chemical composition.

The orography of Sulcis is highly tectonic and fractured, the flat areas being confined to the foothill, joint to the grabens of Campidano and Cixerri. The main range stretches from NNE to SSW. The rivers are radially oriented, rather short and torrent-like. The main rivers are Riu Palmas, Riu Gutturu Mannu and Riu Pula. The highest point of Sulcis is Punta Is Caravius (1113 m).

The climatic records, processed by the method proposed by Rivas-Martínez & al. (1999, 2002) let to classify the study area within the Mediterranean macrobioclimate and the pluviseasonal oceanic bioclimate. Thermotypes range between the lower thermo- and the upper mesomediterranean and ombrotypes between the lower dry and the lower humid (Bacchetta 2000).



Figs 1-3. **1)** The Sardo-Corsican biogeographic province, with Sulcis pointed out; **2)** The biogeographic sector of Sulcis-Iglesiente, formed by the subsectors Iglesiente (to the north) and Sulcis (to the south); **3)** Geomorphologic features of the Sulcis Subsector.

The above-mentioned lithologic, geomorphologic and bioclimatic features enriched the Sulcis-Iglesiente with peculiar vegetation-types, such as the endemic series of *Rusco aculeati-Querco calliprini* Σ (Mossa 1990), occurring on sandy soils both inland and along the coasts, within the thermomediterranean dry bioclimatic belt.

Material and methods

This paper is based on peer bibliographic and herbarium surveys, integrated by several field trips carried out in different seasons.

The bibliographic survey was focused on all reports dealing with the flora of Sulcis, as well as on the main floristic contributions referred to the whole island.

The herbarium survey was carried out at the Universities of Cagliari (CAG), Catania (CAT), Firenze (FI), Sassari (SS and SASSA), Torino (TO) and Valencia (VAL).

The field trips let to observe and collect specimens in many stands. Particular attention was paid to the collection of germoplasm and cultivation of critical taxa, in order to study their life cycle.

To classify the collected specimens, the following works were consulted: Flora Europaea (Tutin & al. 1964-80; 1993), Flora d'Italia (Pignatti 1982), Flora dels Päisos Catalans (Bolòs & Vigo 1984-2001), Flora Iberica (Castroviejo & al. 1986-2003) and the monograph Le piante endemiche della Sardegna (Arrigoni & al. op. cit.). The classification of ferns followed Ferrarini & al. (1986) and Salvo Tierra (1990), while that of orchids was based on Scrugli (1990), Grünanger (2000), Delforge (2001).

All collected specimens have been stored in CAG and CAT. The abbreviations of the author's names follow the Authors of plant names, by Brummit & Powell (1992). Taxonomical ranks accord to Judd & al. (2002). The biologic form of the surveyed taxa was checked in the field and expressed by the abbreviations reported in Pignatti (1982) based on the Raunkiaer's classification (Raunkiaer 1934). The general chorological classification follows chiefly: Le piante endemiche della Sardegna (Arrigoni & al., op. cit.) and Atlas Florae Europaeae (Jalas & Suominen 1972-1994; Jalas & al. 1996-1999; Kurtto & al. 2004).

In particular, for the chorological classification of the endemics, the units proposed by Arrigoni & Di Tommaso (1991) are adopted, with the addition of the following ones: Endemic to Sardinia and Sicily (ESS), Endemic to the Tyrrhenian Islands and N-Africa (ETI-NA) and W-Mediterranean insular endemic (EMOI).

For the individualization of the biogeographic territories, the criteria proposed by Rivas-Martínez (2002), Alcaraz-Ariza (1996) and Berastegui & al. (1997) have been followed.

The risk classes of endangered and/or protected taxa are quoted from the IUCN (IUCN 1994, 2001, 2003; Conti & al. 1997; Pignatti & al. 2001), CITES (CITES 1973; CEE 2001), Berne Convention (CEE 1982), Habitat Directive 92/43 (CEE 1992) and from the: Proposed Regional Law for the Protection of Sardinian Flora (Bacchetta & al. 1999).

Basing on the results of field investigation and consulted literature, it is here proposed to change the risk class of some of surveyed taxa, according to the IUCN procedures (IUCN 2001, 2003).

As 'endemic' we considered all taxa whose distribution range was not exceeding the limits of a biogeographic subregion, according to Ladero Alvarez & al. (1987) classifica-

tion. Among the wide-ranging endemics, particular attention was paid to those mainly restricted to insular areas.

Results

The flora of Sulcis counts 122 endemic taxa (Tab. 1), belonging to 23 orders, 80 genera, 34 families and 23 orders. The surveyed taxa include 81 species, 32 subspecies, 5 varieties and 4 hybrids. For each taxon, in Table 1 are reported: family, biologic form, geographic distribution and current protection estate. In the rightmost column, the protection measures proposed in the Regional Law for the protection of Sardinian flora are reported. The law is currently submitted to the Regional Cabinet.

The biologic spectrum of the endemic flora of Sulcis highlights the dominance of hemicryptophytes (32.8%), followed by geophytes (23.8%), chamaephytes (23.0%), therophytes (10.7%), nanophanerophytes (4.9%), phanerophytes (4.1%) and hydrophytes (0.8%).

The high number of hemicryptophytes and chamaephytes can be related both to the Mediterranean climatic conditions and to the abundance of natural habitats, mainly rupestrian, of Sulcis. The richness in geophytes remarks the Mediterranean-type climate, even if the datum is strongly influenced by the orchids, representing the 38% of the total geophytes.

The low percentage of nanophanerophytes and phanerophytes can be explained by the slow speciation rate of such entities, due to their long generation time.

The few therophytes may testify the integrity of the natural conditions of Sulcis, even if no data are available for comparison with the percentage of endemic therophytes in other Sardinian sectors.

The hydrophytes are represented by *Isoëtes velata* subsp. *tegulensis*, the only endemic waterplant of Sardinia. It is well known that water acts as an homogenising factor on floras. Moreover the study area does not offer many ecological niches suitable for hydrophytes.

Almost all the vascular endemics of Sulcis are *Angiospermae*, with 97 *Dicotyledones* s. l. and 24 *Monocotyledones*. There is not any endemic *Gymnospermae* s. l. and just one *Pteridophyta* s. l. (*Lycopodiophyta*). The orders counting the highest number of endemics are *Lamiales* (17 taxa), *Asparagales* and *Asterales* (14), *Fabales* (11), *Polygonales* (10). The families counting the highest number of endemics are: *Asteraceae* (14), *Orchidaceae* and *Fabaceae* (11), *Scrophulariaceae* (10), *Apiaceae*, *Caryophyllaceae* and *Plumbaginaceae* (7). The most represented genera are: *Ophrys* (9), *Genista* (7) and *Limonium* (6).

Eight of the surveyed *taxa*, are restricted to Sulcis: *Anchusa formosa*, *Genista bocchierii*, *G. insularis* ssp. *insularis*, *Limonium carisae*, *L. malfatanicum*, *L. tigulianum*, *Ophrys* × *domus-maria*, *Silene martinolii*.

In addition to the above mentioned taxa, those endemic to Sulcis-Iglesiente are as well very important from the biogeographic viewpoint. They are: *Anchusa littorea*, *Armeria sulcitana*, *Borago morisiana*, *Dianthus mossanus*, *Helichrysum montelinasanum*, *Limonium sulcitanum*, *Ophrys* ×*maremmae* nsubsp. *woodii* and *Verbascum plantagineum*. These taxa confirm the noteworthy floristic autonomy of the Sulcis-Iglesiente massifs, isolated from the other mountains of Sardinia by the Graben of Campidano.

In addition to the taxa known from literature, the following ones are new to the endemic flora of Sulcis: *Coyncia monensis* subsp. *recurvata* (Mining of Rosas, Narcao), *Doronicum* gr. *corsicum* (Mt. Lattias, Uta), *Linaria cossoni* (Terra Sarina, Masainas), *Lavatera triloba* subsp. *pallescens* var. *minoricensis* (Chia, Domus de Maria), *Ophrys* × *laconensis* nssp. *laconensis* (Mt. Tamara,) and *Phalaris arundinacea* subsp. *rotgesii* (Mt. Lattias, Uta). In particular, *Doronicum* gr. *corsicum* was previously known only from Corsica and the record from Sulcis is new to the Italian flora. The same holds for *Linaria cossoni*, known up to now as endemic to the Tunisian coast.

The chorology of the surveyed taxa include 32.0% of Sardo-Corsican endemics, 26.2% of Sardinian endemics, altogether representing 58.2% of the total. As highlighted by Arrigoni & Di Tommaso (op. cit.) and by Mossa & Bacchetta (1998), most of the Sardinian endemics are linked to carbonate substrata, while the sardo-corsican ones to crystalline and metamorphic.

The taxa, whose distribution range is limited to insular areas, represent 84.4% of the total. Among them, 32 are endemic to Sardinia, 39 are Sardo-Corsican endemics, 17 are also occurring in the Tuscan Archipelago, 15 are in common with Sicily and further 15 are in common with the other W-Mediterranean islands (11 with Balearic Islands and 4 with Hyères Islands). Within the 15.6% taxa whose distribution range includes some continental territories, 9 are Tyrrhenian insular endemics stretching up to N-Africa; 7 are Tyrrhenian endemics *sensu strictu* and 3 are W-Mediterranean (Catalan-Provençal Province) endemics.

The above mentioned percentages confirm the biogeographic framing of the Sulcis territories within the Sardo-Corsican Province, Tyrrheno-Sicilian Superprovince and W-Mediterranean Subregion. On the other side, a strong floristic connection between Sulcis and Sicily or Northern Africa is highlighted, although the most remarkable feature still remains the floristic autonomy of the Sardo-Corsican flora, and particularly of Sulcis-Iglesiente, due to the evolution *in situ* of its original elements, descending from the Tertiary Mediterranean flora (Braun-Blanquet 1926; Contandriopoulos 1962; Faverger 1975; Arrigoni 1983). This hypothesis is not only supported by the high number of exclusive taxa and by the low number of species in common with continental areas, but also by the low number of subspecies (32) in comparison with the number of species (81).

Concerning the conservation measures (Tab. 1), our survey recorded for Sulcis 23 taxa included in the IUCN red lists, 13 of them considered at lower risk (LR), 6 vulnerable (VU), 3 endangered (EN), and 1 critically endangered (CR C).

Four *taxa* are included in the Habitat Directive CEE 92/43 and subsequent updates: one of them is prior (*Limonium insulare*) and three are not (*Linaria flava* subsp. *sardoa*, *Rouya polygama*, *Brassica insularis*).

The CITES Convention includes all *Orchidaceae* in its annex 2 and *Rouya polygama*. No taxa are quoted in the Berne Convention.

The proposed “Regional Law for the Protection of Sardinian Flora” (Bacchetta & al. 1999), currently submitted to the Regional Cabinet, includes 39 of the surveyed taxa, 10 of which are considered at a very high risk of extinction (A), 13 at high risk (B), 10 at medium risk (C) and 6 at low risk (D) (Tab. 1).

Table 1. The list of taxa endemic to Sulcis. Biogeography: WMS - W Mediterranean Subregion, ITS - Italo-Tyrrhenian Superprovince, SCP - Sardo-Corsican Province, SSP - Sardinian Subprovince, SIS - Sulcis-Iglesiente Sector, SSS - Sulcis Subsector. Extinction risk level: A - very high, B - high, C - medium, D - low.

N°	Taxonomic Units	Biol. Type	Chorology	Biogeographic Units	IUCN	Habitat	CITES	L. Reg.
1	*Allium parciflorum* Viv.	G	SA-CO	SCP.				
2	*Allium roseum* var. *insulare* Gennari	G	SA-CO	SCP				
3	*Anchusa formosa* Selvi, Bigazzi & Bacchetta	H	SA	SSS				A
4	*Anthemis arvensis* ssp. *acrochordona* Briq. & Cavill.	T	SA-SI	ITS				
5	*Apium crassipes* (Koch) Rchb. f.	H	SA-CO-SI-ITM	ITS				A
6	*Arenaria balearica* L.	H	SA-CO-AT-BL	WMS				
7	*Aristolochia navicularis* Nardi	G	SA-SI-TN-AG	WMS				
8	*Aristolochia insularis* Nardi &Arrigoni	G	SA-CO	SCP				
9	*Aristolochia tyrrhena* Nardi & Arrigoni	G	SA	SSP				A
10	*Armeria sulcitana* Arrigoni	H	SA	SIS	LR			A
11	*Arum pictum* L. f. subsp. *pictum*	G	SA-CO	SCP				
12	*Astragalus terraccianoi* Vals.	NP	SA-CO	SCP				A
13	*Barbarea rupicola* Moris	H	SA-CO	SCP				B
14	*Bellium bellidioides* L.	H	SA-CO-BL	WMS				
15	*Bellium crassifolium* Moris	Ch	SA	SSP	LR			B
16	*Biscutella morisiana* Raffaelli	T	SA-CO	SCP				
17	*Bituminaria morisiana* (Pignatti & Metlesics) Greuter	Ch	SA-TN	WMS				
18	*Borago pygmaea* (DC.) Chater & Greuter	H	SA-CO-AT	ITS	LR			B
19	*Brassica insularis* Moris	Ch	SA-CO-SI-TN	WMS		NP		D
20	*Bryonia marmorata* Petit	G	SA-CO	SCP				
21	*Bunium corydalinum* DC. subsp. *corydalinum*	G	SA-CO	SCP				
22	*Carduus sardous* DC.	H	SA-CO-AT	ITS				
23	*Carex microcarpa* Bertol. *ex* Moris	H	SA-CO-AT	ITS				
24	*Centaurium erythraea* subsp. *rhodense* (Boiss. & Reuter) Melderis	T	SA-CO-SI-ITM	ITS				
25	*Coyncia monensis* subsp. *recurvata* (All.) E. A. Leadlav	T	SA-CO	SCP				B
26	*Crepis vesicaria* subsp. *hyemalis* (Biv.) Babc.	T	SA-SI	ITS				
27	*Crocus minimus* DC. *in* Rèdouté	G	SA-CO-AT	ITS				
28	*Cymbalaria aequitriloba* (Viv.) A. Chev. subsp. *aequitriloba*	Ch	SA-CO-AT-BL	WMS				
29	*Delphinium longipes* Moris	H	SA	SS.				
30	*Delphinium pictum* Willd.	H	SA-CO-BL-H	WMS	LR			D
31	*Delphinium requienii* DC.	H	SA-CO-H	WMS				D
32	*Dianthus mossanus* Bacchetta &Brullo	Ch	SA	SIS				B

Table 1. (continued.)

33	*Dianthus arrosti* C. subsp. *sardous* Bacchetta, Brullo, Casti & Giusso	Ch	SA	SSP				B
34	*Digitalis purpurea* var. *gyspergerae* (Rouy) Fiori	H	SA-CO	SCP				D
35	*Dipsacus ferox* Loisel.	H	SA-CO	SCP				
36	*Doronicum* gr. *corsicum* (Loisel.) Poiret	H	SA-CO	SCP				
37	*Eupatorium cannabinum* subsp. *corsicum* (Loisel.) P. Fourn.	H	SA-CO-ITM	ITS				
38	*Euphorbia amygdaloides* subsp. *arbuscula* Meusel	Ch	SA-SI-ITM	ITS				
39	*Euphorbia cupanii* Guss. *ex* Bertol.	G	SA-CO-SI	ITS				
40	*Euphorbia semiperfoliata* Viv.	Ch	SA-CO	SCP				B
41	*Ferula arrigonii* Bocchieri	H	SA-CO	SCP	LR			B
42	*Galium corsicum* Sprengel	H	SA-CO	SCP				
43	*Genista aetnensis* (Biv.) DC.	P	SA-SI	ITS				D
44	*Genista bocchierii* Bacchetta, Brullo & Feoli	P	SA	SSS				
45	*Genista corsica* (Loisel.) DC. in Lam. & DC.	NP	SA-CO	SCP				
46	*Genista ferox* Poiret	NP	SA-AG-TN	WMS	VU			A
47	*Genista insularis* Bacchetta, Brullo & Feoli subsp. *insularis*	P	SA	SSS				
48	*Genista morisii* Colla	NP	SA	SSP	LR			A
49	*Genista valsecchiae* Brullo & De Marco	P	SA	SIS				A
50	*Helichrysum montelinasanum* Em. Schmid.	Ch	SA	SIS	LR			A
51	*Hordelymus caput-medusae* subsp. *crinitus* (Schreber) Pignatti	T	SA-SI-ITM	ITS				
52	*Hyoseris taurina* (Pamp.) Martinoli	Ch	SA-TN	WMS	LR			B
53	*Hypericum hircinum* L. subsp. *hircinum*	NP	SA-CO-AT	ITS				
54	*Hypochaeris sardoa* Bacchetta, Brullo & Terrasi	H	SA	SSP				A
55	*Isoëtes velata* subsp. *tegulensis* (Gennari) Batt. & Trabault	I	SA-TN	WMS	VU			A
56	*Lavatera triloba* subsp. *pallescens* (Moris) Nyman var. *minoricensis*	NP	SA-BL	WMS	CR			A
57	*Leucanthemum flosculosum* (L.) P. Giraud	Ch	SA-CO-AT	ITS				
58	*Limonium carisae* Erben	Ch	SA	SSS				A
59	*Limonium dubium* (Andr. *ex* Guss.) R. Lit.	Ch	SA-CO-SI	ITS				
60	*Limonium glomeratum* (Tausch) Erben	Ch	SA-SI	ITS				
61	*Limonium insulare* (Bég. & Landi) Arrigoni & Diana	Ch	SA	SSP	VU	P		C
62	*Limonium malfatanicum* Erben	Ch	SA	SSS				A
63	*Limonium tigulianum* Arrigoni & Diana	Ch	SA	SSS				C
64	*Linaria arcusangeli* Atzei & Camarda	Ch	SA	SSP	VU			A
65	*Linaria cossoni* Barratte	H	SA-AG	WMS				A
66	*Linaria flava* subsp. *sardoa* (Sommier) Arrigoni	T	SA-CO	SCP	LR	NP		A
67	*Lotus cytisoides* subsp. *conradiae* Gamisans	Ch	SA-CO	SCP				D
68	*Medicago intertexta* var. *tuberculata* Moris	T	SA	SSP				

Table 1. (continued.)

69	*Mentha insularis* Req. ex Gren. & Godr. subsp. *insularis*	H	SA-CO-AT-BL	WMS				
70	*Mentha requienii* Benth. subsp. *requienii*	H	SA-CO	SCP	LR			A
71	*Mercurialis corsica* Cosson	Ch	SA-CO	SCP				B
72	*Minuartia verna* subsp. *grandiflora* (C. Presl) Hayek	H	SA-SI	ITS	LR			C
73	*Nananthea perpusilla* (Loisel.) DC.	T	SA-CO	SCP	LR			A
74	*Oenanthe lisae* Moris	H	SA	SSP				C
75	*Orchis mascula* subsp. *ichnusae* Corrias	G	SA-BL	WMS			C2	C
76	*Orchis ×penzigiana* nssp. *Sardoa* Scrugli & Grasso	G	SA	SSP			C2	B
77	*Ophrys annae* Devillers-Tersch.	G	SA-CO	SCP			C2	
78	*Ophrys eleonorae* Devillers-Tersch. & Devillers	G	SA-CO-TN	WMS			C2	
79	*Ophrys conradiae* Melki & Deschâtres	G	SA-CO	SCP			C2	D
80	*Ophrys chestermanii* (Wood) Golz & Reinhard	G	SA	SSP			C2	C
81	*Ophrys morisii* (Martelli) Soo *in* Keller & al.	G	SA-CO	SCP			C2	
82	*Ophrys scolopax* subsp. *sardoa* H. Baumann, Giotta, Lorenz, Künkele & Piccitto	G	SA	SSP			C2	C
83	*Ophrys ×domus-maria* Grasso	G	SA	SSS			C2	
84	*Ophrys ×laconensis* Scrugli & Grasso nssp. *laconensis*	G	SA	SSP			C2	C
85	*Ophrys ×maremmae* nssp. *woodii* Corrias	G	SA	SIS			C2	A
86	*Ornithogalum biflorum* Jord. & Fourr.	G	SA-CO	SCP				
87	*Orobanche rigens* Loisel.	G	SA-CO	SCP				
88	*Paeonia morisii* Cesca, Passalacqua & Bernardo	G	SA-CO	SCP				B
89	*Pancratium illirycum* L.	G	SA-CO-AT	ITS				C
90	*Phalaris arundinacea* subsp. *rotgesii* (Husnot) Kerguélen	H	SA-CO	SCP				
91	*Poa balbisi* Parl.	G	SA-CO	SCP				
92	*Polygonum scoparium* Req. *ex* Loisel.	Ch	SA-CO	SCP				
93	*Ptilostemon casabonae* (L.) Greuter	Ch	SA-CO-H-AT	WMS				
94	*Ranunculus cordiger* subsp. *diffusus* (Moris) Arrigoni	H	SA-CO	SCP				
95	*Ranunculus revelieri* Boreau	T	SA-CO-GA	WMS	LR			
96	*Robertia taraxacoides* (Loisel.) DC.	H	SA-CO-SI-IT	ITS				
97	*Romulea requieni* Parl.	G	SA-CO	SCP				
98	*Rouya polygama* (Desf.) Coincy	H	SA-CO-TN	WMS	VU	NP	**X**	
99	*Rumex scutatus* subsp. *glaucescens* (Guss.) Brullo, Scelsi & Spampinato	H	SA-SI-CAL	ITS				
100	*Rumex suffocatus* Moris *&* Bertol.	H	SA	SSP	VU			C
101	*Salix arrigonii* Brullo	P	SA	SSP				C
102	*Saxifraga corsica* (Ser. ex Duby) Gren. & Godr.	H	SA-CO	SCP				
103	*Scilla autumnalis* var. *corsica* (Boullu) Briq.	G	SA-CO	SCP				

Table 1. (continued.)

104	*Scilla obtusifolia* Poiret subsp. *obtusifolia*	G	SA-AG	WMS				B
105	*Scrophularia canina* subsp. *bicolor* (Sibth. & Sm.) Greuter	H	SA-SI	ITS				
106	*Scrophularia ramosissima* Loisel.	Ch	SA-CO-BL-GA	WMS	LR			C
107	*Scrophularia trifoliata* L.	H	SA-CO-AT	ITS				
108	*Seseli praecox* (Gamisans) Gamisans	Ch	SA-CO	SCP				
109	*Silene corsica* DC.	T	SA-CO	SCP	VU			
110	*Silene martinolii* Bocchieri & Mulas	T	SA	SSS				B
111	*Silene nodulosa* Viv.	H	SA-CO	SCP				
112	*Soleirolia soleirolii* (Req.) Dandy	H	SA-CO-BL-AT	WMS	VU			A
113	*Stachys corsica* Pers.	H	SA-CO	SCP				D
114	*Stachys glutinosa* L.	Ch	SA-CO-AT	ITS				
115	*Teucrium marum* L. ssp. *marum*	Ch	SA-CO-BL-AT-H-(GA)-(HS)	WMS				
116	*Teucrium subspinosum* Pourr. ex Willd. subsp. *subspinosum*	Ch	SA-BL	WMS				B
117	*Torilis nodosa* (L.) Gaertner subsp. *nemoralaris* Brullo	T	SA-SI	ITS				
118	*Urtica atrovirens* Req. *ex* Loisel. subsp. *atrovirens*	H	SA-CO-AT	ITS				
119	*Verbascum conocarpum* Moris	H	SA-CO-AT	ITS				
120	*Verbascum plantagineum* Moris	H	SA	SIS				B
121	*Vinca sardoa* (Stearn) Pignatti	Ch	SA	SSP				
122	*Viola corsica* Nym. subsp. *limbarae* Merxm. & Lippert	H	SA	SSP				C

Discussion

Basing on the field investigation carried out in the present survey, 8 taxa have been recorded from Sulcis for the first time and 2 of them are new to the Italian flora. The data processing allows to propose some changes in the IUCN rank of the 14 taxa restricted to the Sulcis-Iglesiente biogeographic sector (Tab. 2): 3 of them are proposed as critically endangered (CR), 2 as endangered (EN), 2 as vulnerable (VU), 3 as near threatened (NT), 3 as least concern (LC) and 1 as data deficient (DD).

Due to the relatively high number of exclusive endemics of Iglesiente and Sulcis-Iglesiente, it is here proposed a new biogeographic classification for such territories. This is also justified by the palaeogeographic, geologic and geomorphologic peculiarities.

With reference to the biogeographic classifications of Sardinia proposed by Giacomini (1958), Pellettier (1960), Arrigoni (1968) and Ladero Alvarez & al. (1987), we esteem that Sardinia and Corsica should be considered an independent biogeographic province, that can be further divided into a Sardinian and a Corsican Subprovinces. In the frame of such division, by considering the already mentioned abiotic and biotic peculiarities, we propose to confer the rank of biogeographic sector to the Sulcis-Iglesiente territory and the rank of sub sector to Sulcis (Fig. 3).

Table 2. Proposed changes of the IUCN ranks of some taxa endemic to the Sulcis-Iglesiente biogeographic sector.

Table 2. Proposed changes of the IUCN ranks of some taxa endemic to the Sulcis-Iglesientebiog

No.	Taxonomic Unit	IUCN rank		Biogeographic unit
		Current	Proposed	
1	*Anchusa formosa* Selvi, Bigazzi & Bacchetta		CR B1ac(i,ii,iii,iv) + 2ac(i,ii,iii,iv)	SSS
2	*Armeria sulcitana* Arrigoni	LR	NT	SIS
3	*Dianthus mossanus* Bacchetta & Brullo		LC	SIS
4	*Genista bocchierii* Bacchetta, Brullo & Feoli		EN A2 B1ab(i,ii,iii,v) + 2ab(i,ii,iii,v) C2a (ii)	SSS
5	*Genista insularis* Bacchetta, Brullo & Feoli subsp. *insularis*		NT	SSS
6	*Genista valsecchiae* Brullo & De Marco		LC	SIS
7	*Helichrysum montelinasanum* em. Schmid	LR	VU D2	SIS
8	*Limonium carisae* Erben		CR B1ab(i,ii,iii,iv,v) + 2ab(i,ii,iii,iv,v) C2b	SSS
9	*Limonium malfatanicum* Erben		CR B1ab(i,ii,iii,iv,v) + 2ab(i,ii,iii,iv,v)	SSS
10	*Limonium tigulianum* Arrigoni & Diana		LC	SSS
11	*Ophrys* ×*domus-maria* Grasso		DD	SSS
12	*Ophrys* ×*maremmae* nsubsp. *woodii* Corrias		VU B1ac(iii, iv) + 2ac(iii, iv)	SIS
13	*Silene martinolii* Bocchieri & Mulas		EN B1a+2a	SSS
14	*Verbascum plantagineum* Moris		NT	SIS

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