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Phytogeographic studies in the Sinis peninsula (C. W. Sardinia): Capo S. Marco

Abstract

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Results of floristic studies in Capo S. Marco, the southern extremity of the once Sinis peninsula, are presented. The flora is composed of 400 specimens, just belonging to 64 families and 242 genera and includes species of notable phytogeographic importance which have the base of their habitat here. The floristic list of Capo S. Marco has been analysed in order to elaborate the life forms, to check the different growth forms of the plants in response to environmental factors, to record the phytogeographic elements of all species so as to show the various geographic components. Ecologic characteristics of about 50% of the flora characterizing the landscape of Capo S. Marco are considered.

This work is part of a phytogeographic study of the Sinis peninsula. The previous works have examined the flora in the areas of Capo Mannu (Boechieri & al. 1988), Torre del Secco (Mulas 1993) and Mari Ermi (Mulas 1988). They have enabled us to report on the threats to the vegetation resulting from human activities (Boechieri & Mulas 1991).

The territory

The area of this study is the southern most part of the Sinis peninsula and belongs administratively to the borough of Cabras, included on May 21st of S.E. Capo San Marco of the Military Geographic Institute. It is 2.5 km long and 100-300 m in width and its maximum height, occurring between N. ghe Raboe Cabita and Torre Vecchia, is 57 m. In accordance with the subdivisions of the floristic territories proposed by Aragoni (1983), Capo San Marco is in the Campidano district of the coastal and fully subsector of Sardinia.

The geological section of the Cape shows a base characterized by originigenic sea-limestones and laminated limestones, which are both attributed to the Messinian. This sedimentary formation is covered with basals of various thickness of P. to-Pleiocene age. Of particular importance are the sandy deposits represented by aeolic gritstones of the Würmian and by conglomerates, especially rich in boulders. To the south of the river of S. Giovanni there are expanses of aeolic sands which rest on the Tyrrhenian bank in the southern eastern part (Cherchi & al. 1978).

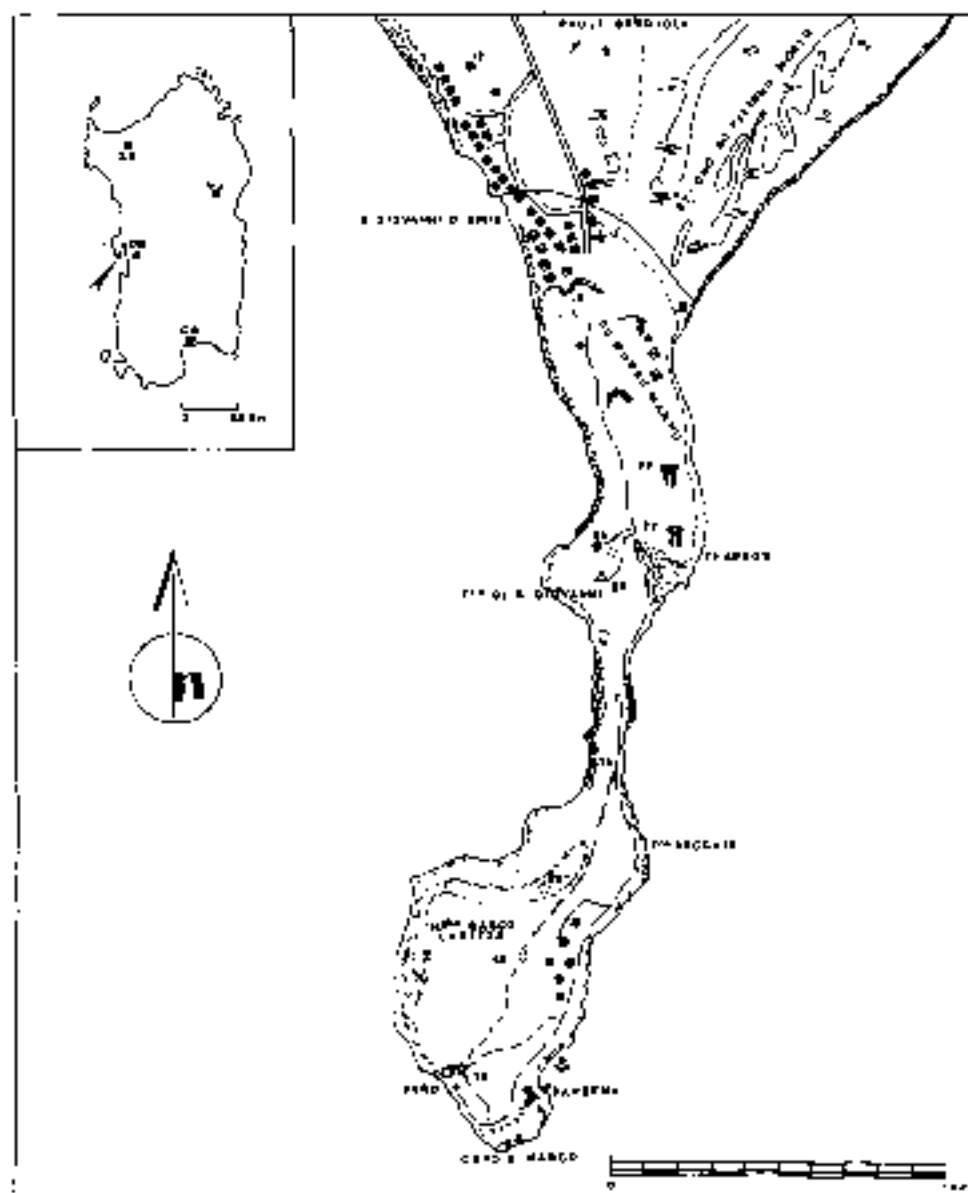


Fig. 1. Capo S. Marco.

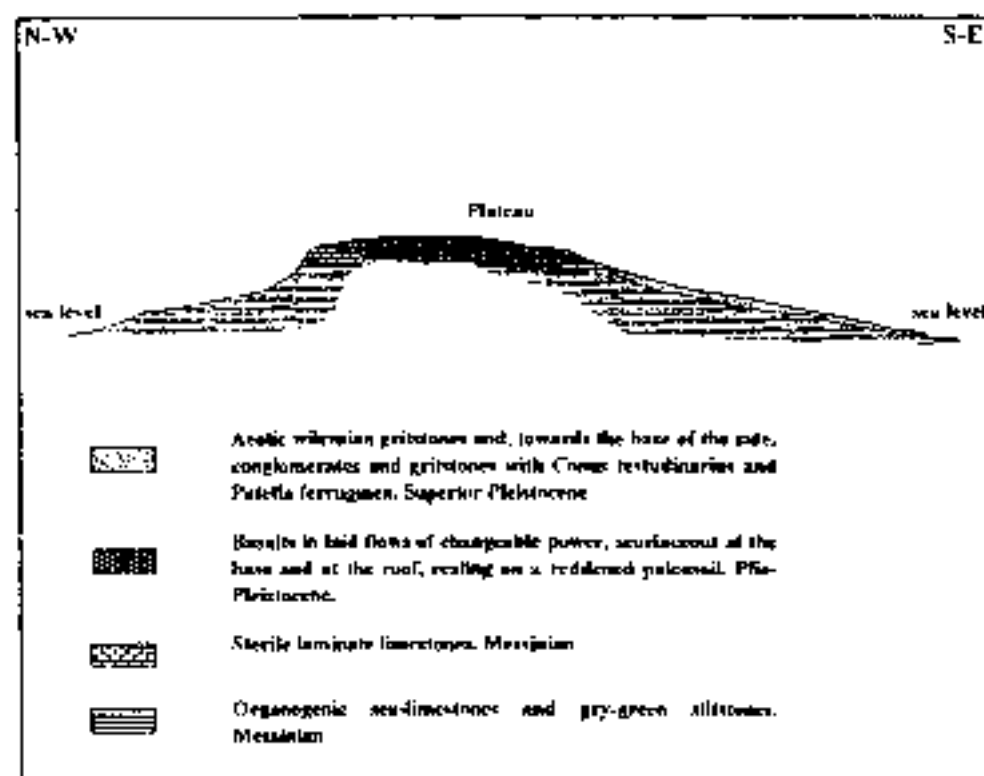


Fig. 2. Schematic geological section of Capo S. Marco.

According to Pirani (1980), during a sea-ingression of the Pleistocene, Capo S. Marco was disconnected by the basaltic flow and was subsequently rejoined by sandy deposits.

Sandy and rocky coasts alternate along the Cape. In some points, they degrade gradually towards the sea and in others, like in the neighbourhood of the lighthouse, they make cliffs 40 m high.

For climatic details, see the previously mentioned works (Brocchieri & al. 1988, Mulas 1986, 1992) and those on the nearby Capo Ferro (Brocchieri & Mulas 1992) which closes the whole Gulf of Oristano to the south.

The flora

Capo S. Marco has never before been subjected to a detailed study. In addition to some records reported by Barbey (1881) concerning seaweed and fungi and Nimis & Poelt (1987) for lichens, this territory is quoted in the work on the distribution and sociology of *Chamaecyparis balearica* L. (Chiesura Lorenzoni & Lorenzoni 1977), the psammophilous coastal vegetation of southern Sardinia (Barolo & al. 1989, Brocchieri & al. 1982, De Marco & Mossa 1980), the distribution of *Ephedra distachya* L. (Desole 1949, 1965) and

the description and recording of some endemics (Arrigoni & al. 1977-1993, Boccheri 1988, Dôcher & Pignatti 1971). Dôcher (1971) includes Capo San Marco among the significant biotopes.

Our collections began at the end of 1990 and continued monthly until the end of 1991. The specimens, kept in the Herbarium CAG, have been determined using *Flora Europaea* (Tutin & al. 1964-1993), *Flora d'Italia* (Pignatti 1982) and, as regards the endemic plants, the contributions of Arrigoni & al. (1977-1993).

The systematic order presented below is that of *Flora Europaea*. For nomenclature, we have followed *Flora Europaea*, *Atlas Florae Europaeae* (Dallas & Suominen 1977-1981), and *Medi-Checklist* (Grecuter & al. 1984-1989).

For each taxon, the nomenclitical form was checked in field and quoted in accordance with Ratinkier'.

s terminology (Ratinkier 1954). The growth forms are given according to Arrigoni & Di Tommaseo (1991), the phytogeographical units, according to Arrigoni (1983). One or more localities, habitat and abundance are given for each taxon.

Floristic list

Proctoraceae

Loezy hirtella Hory. - Gibbulh, PT, M-Ar

Temporary pools of the polder situated between the lighthouse and Nighe Baboe Calatao, rare.

Asplenaceae

Asplenium adnigrum L. - H ros, PT, G-Pt

Wet rocks to the west of S. Giovanni's tower, very rare.

Cupressaceae

Juniperus phoenicea L. - P encsp P encsp, W.A. M

Scrub - sporadic.

Ephedraceae

Ephedra distachya L. - NP, WS, T-Ar

Sands of the isthmus, frequent.

Myrtaceae

Myrtus communis L. - P encsp, W.A. T

Between S. Giovanni's tower and the ruins of Tharros; rare.

Ericaceae

Calluna vulgaris L. - T scsp, H ros, SCr

Near the harbour, common.

Ulva membranacea Porol. + T scap. Hi Others, T

Clearings near the lighthouse and the harbour, common.

Parvetaria jelskii L. + H scap. Hi Others, T Eu

In the crevices of S. Giovanni's tower, frequent

Parvetaria hibernica L. + T rept. Hi Ave, T-Eu

Near the houses of Torre Vecchia, rare

Santalaceae

Oxyria L. + N-E, W-S, Eu-M

Among the scrubs, frequent.

Rafflesiaceae

Cytisus hypericifolius (L.) L. + T part. Others, M-Ar

Among the expanses of *Crataegus* spines

Balanophoraceae

Ceanothus cuneatus L. + G part. Hi, T

Among the expanses of *Crataegus*, frequent

Polygonaceae

Polygonum maritimum L. + H rept. Hps, SCu

Sands of S. Giovanni at Siro and of Murru Mannu, rare.

Rumex pulchellus L. + H scap. Hi Pse, SCu

Temporary damp meadows near the lighthouse, sporadic

Rumex obtusifolius L. + H scap. Hi Pse, Co

Expanses near the lighthouse and between Torre Vecchia and Naja Basse

Clusia, sporadic

Rumex hexaphylophorus L. + T scap. Hi Ave, M

Sands, clearings of the scrub, rocky fissures, frequent

Amorcanon (L.) Camp. + T scap. Hi Ave, M-Ma

Sands and fallow lands near the harbour, rare.

Chenopodiaceae

Beta maritima L. + H scap. Hi Pse, T-Eu

Near the harbour and among the fissures of the cliffs, frequent.

Chenopodium maritimum L. + T scap. Hi Others, SCu

Among the ruins of Tharros, sporadic.

Chenopodium album L. + T scap. Hi Others, Co

Near the harbour and the houses of Torre Vecchia, sporadic.

Atriplex maritima L. + P scap. W-B, Pl +

Along the path which leads from the lighthouse to the harbour, frequent.

Atriplex portulacastris L. + Cl frut. W-S, Eu-M (coastal)

Near the harbour and along the coasts in the south of the lighthouse and Torre

Vecchia, frequent

Camphorossea myrsinifolia L. - Ch. frut. WF, M-Po

Common everywhere.

Sarcocolla frigidaria (L.) A. Y. Scott - Ch. succ. WS, M-AI

Rocky crinets west of S. Giovanni's tower; sporadic.

Androsace semp macrotachina (Maur. DC) Kuhn - Ch. succ. WS, M-Ma

Rocky coasts west of S. Giovanni's tower; rare

Suaeda vera J. E. Gimelst. - NP, WF, Co

Near the harbour and along the southern coasts; sporadic

Salicornia verba L. - T. scap. Hi Ave. T-Fs

Near the harbour and among the ruins of Tharros; rare.

Salicornia herb. L. - T. scap. Hi Ave. SCo

Sands of the isthmus and of the harbour; rare.

Aizoaceae

Carpobrotus edulis (L.) J. N. E. Br. - Ch. suffr. WS, Naturalized

Sands near the forts of S. Giovanni di Sinis; frequent.

Mesembryanthemum nodiflorum L. - T. scap. Her, T

Coastal meadows near Torre Vecchia; frequent.

Caryophyllaceae

Arenaria repulifolia L. - T. scap. Hi Ave. SCo

Among the ruins of Tharros; rare

Stellaria media (L.) Vill. - T. rept. Hec, SCo

Among the scrub of the plateau and in the coolest zones; frequent

Stellaria pallida (Dumort.) Pire - T. scap. Hi Ave. T-Fu

Under the bushes near Torre Vecchia; rare.

Cerastium glomeratum Thuill. - T. scap. Hi Others. Co

Among the ruins; sporadic.

Cerastium pumilum Curt. s. - T. scap. Hec, En-M

Meadows of Torre Vecchia and near the Topher of Tharros; rare

Sagina acetosa Ard. - T. scap. Hec. T-Fu

Interruptions of the scrub and meadows; frequent.

Sagina maritima (L.) Dum. - T. scap. Hec. T-Fu (constant)

Southern sector of the cape; rare

Polygala echinolata Chatter - T. scap. Hec. M-Ma

Clearings, meadows and rocky fissures; frequent.

Polygala argentea Lam. - H. erect. sp. Hps, M-Ma

Sands of Murru Mannu; sporadic

Polygoma tetraphyllum (L.) L. subsp. *tetraphyllum* - T. scap. Hec, SCo

Interruptions of the scrub; frequent.

Polygoma tetraphyllum (L.) L. subsp. *strampelliana* (Rydb.) Ball - T. scap. Hec, M-AI

Sands of the isthmus; rare

Spergularia rubra (L.) J. & C. Presl. - Ch. suffr. Hec, SCo

Inland clearings of the scrub; sporadic.

Silene alypsa (Moench) Garcke - H. scap. Hi Pvg, SCo

Central western sector of the cape; rare.

Silene acaulis DC. - H scap, Hrg, bar

Sandy zones; frequent

Silene latifolia Poir. - H Bienn, Hi Pvc, M-Pe

Rocky fissures and meadows in the west of N. ph. Baboe Cabitza; sporadic

Silene rupestris (L.) Godron - T scap, Hi Ave, M-Ma

Sands of the isthmus and near the luts; rare

Silene nocturna L. - T scap, Hi Ave, M-Ma

Near S. Giovanni's tower and among the ruins of Tharros; rare

Silene gallica L. - T scap, Hi Ave, Co

Frequent almost everywhere.

Silene conoidea Ten. - T scap, Hi Ave, M-Ma

Sandy zones; frequent.

Silene halimifolia Valsecchi - T scap, Hi Ave, Meo

clench of S. Giovanni di Sinis; sporadic. "This species was described by Valsecchi (1899) and it is part of the group "*Silene rubra* Poir. - *Silene seneca* All. - *Silene capensis* Ten."

Petrorhaga prostrata (L.) P. W. Ball & Heywood - T scap, Hi Ave, T-Eu

Dry meadows and cleared scrub near Torre Vecchia; frequent.

Hamamelidaceae

Nyctaginia floerkeana L. - T scap, Hi Ave, T-Eu

Clearings of the scrub in the plateau; rare

Delphinium longipes Moris - T scap, Hi Ave, M-Ma

Near S. Giovanni's tower and in the gorge south of N. ph. Baboe Cabitza; frequent but localized.

Chamaecladon L. - P herb, WL, Meo

Tall scrub between the harbour and the Lighthouse; rare

Ranunculus villosus Desf. - T scap, Hi Ave, M-Me

Damp meadows and temporary pools; rare.

Ranunculus repens L. - T scap, Hi Ave, T-Eu

Meadows and pools; rare

Ranunculus bolanderi L. - H res, Hv, M

Damp meadows and clearings; frequent but localized

Papaveraceae

Papaver rhoeas L. - T scap, Hi Ave, T-Eu

Near the lighthouse; sporadic.

Papaver hybridum L. - T scap, Hi Ave, T-Eu

Among the ruins of Tharros; sporadic.

Glaucium flavum Crantz - H scap, Hi Pvc, T-Eu, coastal

Sands of the isthmus; frequent

Fumaria caperolata L. - T scap, Hdc, T-Eu

Among the low scrub; frequent.

Fumaria bicolor Sammer - T scap, Hdc, Meo

Among the scrub; rare.

Fumaria laetifica Boreau - T scap, Hdc, T-Eu

Among the scrub: frequent.

Fanoglossa parviflora Lam. - T scap. Hdc. T-Eu

Among the scrub: rare.

Cruciferae

Marouletia ciliolata (L.) R. Br. - F scap. Hi-Pae, M-M

Sands of the isthmus and in some rocky fissures: sporadic.

Matthiola bursapadula (L.) R. Br. - T scap. Hi-Ave, M

Sands, frequent.

Crepidotus hircinus L. - T scap. Hdc, Co

On the plateau: rare.

Lobularia maritima (L.) Desv. - Ch suffr. WS, M-Ma

Rocky and sandy coasts: frequent.

Lepidium greeniiifolium L. subsp. *subreplicatum* (L.) P. Monr. - F scap. WS, Mo

Near the harbour: rare.

Diphysa cuneata (L.) DC. - T scap. Hi-Ave, Eu-M

Among the scrub near Nghe Baboe Calutan: rare.

Hirschfeldia incana (L.) Engelm. T scap. Hi-Ave, M-Ma

Among the ruins of Tharros: rare.

Cakile maritima Scop. subsp. *aegeum* (Willd.) Nym. - T scap. Hdc, M

Sands of the isthmus and among the paths of the ruins of Tharros: frequent.

Raphanum caeruleum (L.) All. subsp. *immaculatum* Royle & Fene. - T scap. Hi-Ave, M

Among the paths: rare.

Crassulaceae

Crasula rubra (L.) Garland - T scap. Hps. T-Eu

Meadows and clearings of the scrub: frequent.

Crasula collina (Willd.) Roth - T scap. Hdc, Eu-M

Temporary pools of the plateau: rare.

Crithopsis capensis (Susske.) Dandy - G bulb. Hdc, T-Eu

Rocky fissures of the western cliff: sporadic.

Crithopsis frongantalis (Guss.) DC. - G bulb. Hdc, M-Ma

Fissures near the ruins: very rare.

Sedum sedifolium (Jacq.) Pat. - Ch succ. WS, Eu-M

Ruins and fissures near Terra Vecchia: frequent.

Sedum rubens L. - T scap. Hdc, T-Eu

Plateau near the light-house: rare.

Sedum rupestris L. - T scap. Hdc, Mo

Meadows and fissures: sporadic.

Rosaceae

Rubus idaeiformis Schott - NP, WS, T-Eu

Eastern sector of the ruins of Tharros: rare.

Sorbus chamaemorus Scop. subsp. *repens* (Boiss. & Reuter) Nordborg - F scap. Hi-Eu-M

Among the scrub of the plateau toward the slope: sporadic.

Leguminosae

Anagyris foetida L. - P. caesp. WB, M

Along the path which leads from the plateau to the harbour: common.

Calligonum cilicium (Poir.) Link. - P. caesp. WB, M

On the plateau near the lighthouse and in the harbour: common.

Euphorbia amurensis Cass. - T. scap. Hi Ave. M

Interruptions of the scrub near the isthmus and among the ruins of Tharros: rare.

Avicennia bicolor L. - T. scap. Hi Ave. T

Coastal sands near the huts of S. Giovanni di Sinis and among the ruins of Tharros: frequent.

Vicia sativa L. subsp. *alpina* (L.) Ehrh. - T. scap. Hde. T-Eu

Meadows and clearings of the scrub: rare

Vicia hirta L. - T. scap. Hi Ave. T-Eu

Among the scrub: very rare.

Lathyrus serotinus L. - T. scap. Hde. M-Ma

Among the scrub and along the paths: sporadic.

Lathyrus cylindrus (L.) DC. - T. scap. Hde. Eu-M

Clearings near Torre Vecchia: sporadic

Lathyrus aphaca L. - T. scap. Hde. T-Eu

Among the scrub: rare.

Pisum sativum L. subsp. *chama* (Boch. & Scherson & Giesbre.) - T. scap. Hde. Eu-M

Among the scrub of the plateau: rare

Ononis aschersonii L. - T. scap. Hi Ave. T-At

Under the scrub and at the edges of the clearings and of the paths: sporadic

Ononis viscaria L. subsp. *hecatheia* (DC.) Nyman - T. scap. Hi Ave. M

Clearings of the plateau: frequent but localized.

Ononis viscaria L. - T. scap. Hps. M-Ma

Sands of the isthmus and of S. Giovanni di Sinis: frequent.

Medicago villosa Desf. - T. scap. Hi Ave. M-Ma

Near S. Giovanni: less frequent.

Medicago orbiculata (L.) Battal. - T. scap. Hps. T-Eu

Among the ruins of Tharros: rare

Medicago emerus L. - Ch. rept. WS. Eu-M

Sandy of the isthmus and near the huts of S. Giovanni di Sinis: frequent.

Medicago limnalis Reiche - T. scap. Hps. M-A

Rocky and sandy coasts, island clearings: frequent.

Medicago furbiana (L.) Ait. - T. scap. Hps. M

Along the path which leads from the lighthouse to the harbour: rare

Medicago polymorpha L. - T. scap. Hps. T-Eu

Present almost everywhere

Medicago micrantha (L.) Battal. - T. scap. Hps. T-Eu

Coastal and scrub zones: frequent.

Trifolium ingewertii Viv. - T. scap. Hps. T-Eu

Damp meadows near the lighthouse and the Tophet of Tharros: frequent

Trifolium glomeratum L. - T. scap. Hi Ave. T-Eu

Clearings of the scrub in the plateau: sporadic.

Trifolium quercosum L. - T. scap. Hde. T

Meadows near Torre Vecchia: rare.

Trifolium repens L. - T rept. Hi Ave, T-Es

Among the scrub: frequent

Trifolium tomentosum L. - T rept. Hps, T

Sandy meadows, sporadic

Trifolium cooperiae Schreber - T scap. Hi Ave, T-Eu

Clearings and interruptions of the scrub: rare.

Trifolium graveolens L. - T scap. Hi Ave, T-Es

Pebbly soils between Torre Vecchia and the harbour: sporadic.

Trifolium vrbatum L. - T rept. Hec, T-Eu

Meadows near the lighthouse and among the scrub: frequent.

Trifolium stellatum L. - T scap. Hi Ave, M-Ma

Along the paths and the lines: rare

Trifolium repens L. subsp. *callicarpi* (Balbis ex Hornem.) Syme - T scap. Hi Ave, Eu-M

Clearings among the scrub and near the lighthouse: frequent

Trifolium cheiridifolium L. - T scap. Hec, T-Eu

Inland and coastal meadows: frequent.

Trifolium angustifolium L. - T scap. Hi Ave, T-Eu

Edges of the palms: sporadic.

Trifolium squarrosum L. - T scap. Hi Ave, M-Al

Meadows near the coast: rare

Trifolium ulpianum L. - T rept. Hps, T-Eu

Near the lighthouse and the harbour: frequent.

Deschampsia cespitosa (L.) Steud. - Chisaffi, WS, Eu-M

Among the rocky fissures and along the path which leads from the lighthouse to the harbour: rare.

Lotus pectinatus Desf. - T scap. Hps, T-Eu

Cliff-slopes of the plateau: very rare.

Lotus angustifolius L. - T scap. Hps, T-Eu

S. Giovanni's tower: rare.

Lotus cordis L. - T scap. Hps, M

Among the scrub and near the Temple of Thauros: frequent

Lotus campylanthensis Procr. - T scap. Hps, M

Meadows between Torre Vecchia and the houses: very rare.

Lotus cretensis L. - Chisaffi, WS, M

Sands and rocks: frequent

Lotus arduus Globet L. - T scap. Hi Ave, M-Pe

Among the scrub: sporadic.

Onobrychis compressa L. - T scap. Hec, T-Eu

Among the scrub and in the clearings: frequent

Hippocrepis antilope L. - T scap. Hec, M-Pe

Clearings and meadows near Torre Vecchia: sporadic.

Scorpiurus maritimus L. - T scap. Hps, T-Pe

Meadows near Torre Vecchia: rare.

Brissonia spinosissima L. - T scap. Hps, Eu-M

Present almost everywhere

Oxalidaceae

- Oxalis pes-caprae* L. - G bulb. Hb. Naturalized.
Near the harbour and Torre Vecchia; frequent.

Geraniaceae

- Geranium molle* L. - T scap. Hi Ave. T-Es
Edges of paths and meadows; frequent.
Geranium purpureum Vill. - T scap. Hi Ave. T-Eu
Among the scrub of the plateau; rare.
Erodium cicutarium (L.) L'Hér. - T scap. Hec. SCu
Meadows and clearings; frequent.
Erodium moschatum (L.) L'Hér. - T scap. Hi Ave. T-Eu
Meadows near the lighthouse; sporadic.

Linaceae

- Linum catharticum* Miller - T scap. Hi Ave. T-Eu
Clearings and meadows; frequent.
Linum trigynum L. - T scap. Hi Ave. O
Particularly pebbly soils near the lighthouse; sporadic.
Linum strictum L. - T scap. Hi Ave. T-Eu
Dry meadows near Torre Vecchia; frequent.

Euphorbiaceae

- Mercurialis annua* L. - T scap. Hi Others. T-Es
Among the paths or the mops or Tharros; rubble and near the harbour; rare.
Euphorbia peploides L. - T scap. Hps. T-Eu
Sands of the isthmus and in the north of S. Giovanni's tower; rare.
Euphorbia dendroica L. - NP. WB. M
South western side of the cape; frequent but localized.
Euphorbia pterocarpa Brot. - T scap. Hi Ave. M Ma
Among the low scrub of the plateau; rare.
Euphorbia heterophylla L. - T scap. Hi Ave. Cu
Clearings near the lighthouse; frequent but localized.
Euphorbia cyparissia L. - T scap. Hi Ave. T-Eu
Meadows and clearings of the scrub near the lighthouse; frequent.
Euphorbia peploides L. - T scap. Hi Others. Cu
Scrub and clearings; frequent.
Euphorbia peploides Gioann. - T scap. Hi Others. M
Scrub and clearings; frequent.
Euphorbia caput-medusae Cass. - G herb. Hri. Eu
Paths of the scrub, rubble and clearings; rare.
Euphorbia paralias L. - Ch trait. Hi Pvc. M-Ai
Sands of the isthmus and of the harbour; frequent.
Euphorbia terracina L. - T scap. Hi Pvc. M Ma

Sandy and inland zones; rare.

Euphorbia characias L. - NP, WS, Mea

Among the scrub of the western sector; rare.

Rutaceae

Rosa chilensis L. - Cr. siltst., WS, M-Ma

Among the scrub of the plateau; frequent.

Anacardiaceae

Prosopis juliflora L. - P. escarp., WB, M-Ma

Common among the scrub.

Rhamnaceae

Rhamnus alaternus L. - P. escarp., WB, M

Along the path which leads to the harbor; very rare.

Malvaceae

Malva edulis L. - H. escarp., Hde., SCa

Rocky lands in the interior near the ruins of Torre Vecchia; rare.

Malva coccinea All. - T. escarp., Hi. Ave., T

Clearings and paths among the scrub of the plateau; rare.

Malva parviflora L. - T. escarp., Hde., T-Eu

Ruins of T. Marcos, edges of the paths and near S. Giovanni's tower; very rare.

Lavatera cretica L. - T. escarp., Hi. Ave., M-Au

Among the scrub; not frequent.

Athaea brenata L. - T. escarp., Hi. Ave., T-Eu

Dry and coastal meadows; rare.

Thymelaeaceae

Thoucaea hirsuta (L.) Engl. - NP, WS, M

Present almost everywhere.

Guttiferae

Hypericum perforatum L. - H. escarp., Hi. Psc., SCa

Clearings and temporary damp meadows near N. the Babee Cabizze; rare.

Cistaceae

Cistus ladanifer L. (= *C. creticus* L. subsp. *creticus* (Viv.) Greuter & Burdet) - NP, WB, M

Among the scrub; frequent but localized.

Cistus monspeliensis L. - NP, WB, M-Ma

Present almost everywhere.

Cistus schiffelii L. — NP, WB, M-Po

Low scrub near the lighthouse; not frequent.

Tuberaria guttata (L.) Fourr. — T scap, Hi Ave, T-Eu

Clayey meadows and edges of the paths; common

Fumana thyrsifolia (L.) Webb + Ch. suffr. WS, M

Eastern and western side of the cape; sporadic

Tamaricaceae

Tamarix canariensis Willd. + P scap, WA, M-Ma

In the ruins of Tamaris near the lighthouse; very rare.

Frankeniaceae

Frankia brevis L. — Ch suffr, WS, M-Po

Sands of the harbour and coastal salt meadows; frequent

Cactaceae

Opuntia maxima Miller + P scap, WB, Naturalized

Near the harbour; localized

Lythraceae

Lythrum hyssagifolia L. — T scap, Hi Ave, SCa

Edges of the pools situated among the scrub of the plateau; rare.

Lythrum hexscherniana (Schrank) Lamy + T scap, Hps, Eu-M

Among the rocks and the meadows of the plateau; rare

Theligonaceae

Theligonum cyathophyllum L. — T scap, Hds, M-Po

Walls and rocky fissures; very rare

Umbelliferae

Eryngium breuilioides Buss. — T scap, Hds, Mco

Damp and muddy meadows of the plateau; rare and localized

Eryngium maritimum L. — G. luz, Hri, Eu-M (coastal)

Sands of the harbour, of the estuaries and of S. Giovanni di Sines; frequent.

Eryngium tripartitum L. — H scap, Hi Pvc, Mco

Among the low scrub of the plateau; rare

Eryngium cicutifolium L. + H scap, Hi Pvc, Eu-M

Among the paths of the scrub; sporadic.

Sium pycnostachyum L. — T scap, Hi Ave, SCa

Clearings and meadows near the lighthouse; rare.

Sium olusatrum L. — H. luz, Hs Pvc, T-Eu

Along the path which leads to the harbour; rare

Cuthion maritima L. - Ch. suffr., WS, M-Ar

Rocky and sandy coastal common.

Foeniculum vulgare Milder subsp. *pipestrum* (Urena) Courinho - H. scap., Hi Pvc, M-Me

Near in the lighthouse and in the harbour, rare.

Duplegium tenuicarpum L. - T. scap., Hi Ave, T

Dry clearings of the plateau: sporadic.

Ammodendron pusillum (Bret.) Brizola - T. scap., Hi Ave, M

Among the low scrub near N.gho Baboe Cabitar, rare

Erada argentea Bocchieri - H. scap., Hi Pvc, Esc

In the south of the sandy isthmus: frequent.

Thapsia gorgonica L. - H. scap., Hi Pvc, M

Near Torre Vecchia, sporadic.

Tuffia arvensis (L.) Gaertner - T. scap., Hi Ave, T-Ep

Clearings near S. Giovanni's tower: very rare

Danthonia cymosa L. subsp. *cymosa* - T. scap., Hi Others, SCv

Among the scrub: sporadic.

Danthonia cymosa L. subsp. *maritima* (Desf.) Ball - H. bienn., Hi Pvc, M

Paths among the scrub: rare.

Danthonia grandis L. subsp. *polygama* (Gussone) Onno - H. bienn., Hi Pvc, M

Among the coastal scrub: frequent.

Primulaceae

Asperula from-sylviana (L.) Duby - T. scap., Hi Ave, T-Ep

Under the scrub oak, in some clearings: frequent

Androsace rosea L. - T. rept., Hps., SCv

Clearings, meadows: common.

Plantaginaceae

Plantago europaea L. - Ch. frut., WS, T-Lu

Near S. Giovanni's tower: localized.

Plantago capensis Arrigoni et Diana - Ch. suffr., WS, T-Lu

Caps. S. Marco, among the seaside rocks and under S. Giovanni's tower: frequent

Plantago glauco-alba (L.) Schrad. et Sm. - Ch. suffr., WS, Esc

Etruscan bank near the ruins of Tharros: frequent.

Plantago subsericea Pignatti - Ch. suffr., WS, Esc

Coastal and rocky zones: frequent

Plantago cretica (L.) Meyer - Ch. suffr., WS, T-Lu

Southern extremity of the Cape: rare (Meyer 1995).

Plantago thapsioides Arrigoni et Diana - Ch. suffr., WS, T-Lu

Coastal zones: frequent

Plantago vulgaris (Willd.) Pourr. - Ch. suffr., WS, X'

Coastal, rocky and rarely sandy zones: sporadic.

Oleaceae

Olea europaea L. subsp. *oleaster* (Hort.) Harris & Link (Neged) - P. caesp., WB, M-Ma

Common among the scrub.

Phillyrea angustifolia L. - P. caesp. WB, M-M

Frequent among the scrub.

Phillyrea latifolia L. - P. caesp. WB, M-M

Along the path which leads from the lighthouse to the lighthouse; rare.

Gentianaceae

Diackstonia perfoliata (L.) Hudson - T. scap. Hi Ave, T-Eu

Cleavings and edges of paths; rare.

Cephaelis anthracina Rafn subsp. *rhodaea* (Reich. & Reuter) Melderis - H. bogm. Hi Ave, M

Along the paths and among the scrub; sporadic.

Cephaelis benedictiana (Hoffmanns. & Link.) Fritsch subsp. *acutiflorum* (Schum.) Zehner - T. scap. Hi Ave, M

Cleavings and meadows; sporadic.

Cephaelis montanum (L.) Fritsch - T. scap. Hi Ave, T-Eu

Meadows of the northern western sector of the cape; rare.

Rubiaceae

Metastasia arvensis L. - T. scap. Hi Ave, SC's

Among the scrub; common.

Cuscutella maritima L. - Ch. suffr. WL, M

Sandy coasts of the cape; frequent.

Galium aparine L. - T. scap. Hde, Co

Near the Tophet of Tharros; sporadic.

Galium aparine (L.) All. - T. scap. Hde, M-Ms

Among the scrub and in the ruins; frequent.

Valeriana maritima L. - T. scap. Hde, M

Dry meadows of the western sector; frequent.

Rubia perigrina L. - P. flou. WL, T-Eu

Among the scrub; common. There are some examples with oval leaf.

Campanulaceae

Calyptranthes soldanella (L.) Boemer & Schultes - Ch. suffr. Hde, SC's sandy coasts

Sandy of the isthmus, of the lighthouse, of S. Giovanni di Sinis; frequent.

Campanula medium L. - Ch. suffr. Hi, SC's

Path among the scrub; sporadic.

Campanula glaberrima (L.) - H. scand. Hde, M-Ms

Among the bushes and at the edges of the paths; common.

Horngiaceae

Hellianthus angustifolius L. - T. scap. Hi Ave, T-Eu

Rocky fissures; rubble; sporadic.

- Cerithia major* L. - T scap, Hi Aes, M
Between the ruins of Tharros and S. Giovanni's tower; common.
- Echino phytanthemum* L. - H bienn. Hdr, T-Eu
Damp meadows, edges of paths, common.
- Erigeron sabulicola* Parnet - H scap, Hps, Mco
Sands of the isthmus, frequent.
- Helian cicutum* L. - H bienn. Hi Ave, Mo
Among the coastal scrub rare.
- Cynodon dactylon* L. - H bienn. H, Ave, T-Eu
Meadows of the degraded scrub near Torre Vecchia, rare.

Labiatae

- Ajuga reptans* (L.) Schreber subsp. *reptans* - Ch suffr, Hec, M-Ma
Dry meadows among the scrub, sporadic.
- Angelica* (L.) Schrenk subsp. *prostrata* (Robt. et Cast.) Albert et Jahn - Ch suffr, Hec, M-Ma
Among the ruins of Tharros; rare. This subspecies has been identified, utilising the analytical key proposed by Valsecchi (1976).
- Teucrium maritimum* L. - Ch frut, WF, Mco
Coastal rocky zones and among the scrub; frequent.
- Teucrium subspinosum* Parnet - Ch frut, WF, Tmo
Southern part of the cape; very rare.
- Teucrium capitatum* L. - Ch suffr, WF, T-Eu
On the plateau near the lighthouse, sporadic.
- Prunum repens* L. - Ch frut, WL, WS, M-Ma
Among the scrub and in the rocky fissures; frequent.
- Sideritis romana* L. - T scap, H Ave, T
Eastern dry meadows near Torre Vecchia, sporadic.
- Lamium prostratum* L. - T scap, Hi Ave, T-Es
Clearings near the lighthouse and along the paths, sporadic.
- Monarda pulegioides* L. - H scap, Hi Pvc, SCu
Temporary damp meadows; frequent.
- Rutaria officinalis* L. - SP, WB, M-Ma
Plateau to the north of the lighthouse; rare.
- Salvia verbenacea* L. - H scap, Hi Others, T-Eu
Edges of paths, frequent.

Solanaceae

- Hesperis matronalis* L. - Ch frut, Hi Pvc, T-Eu
At the foot of S. Giovanni's tower; frequent.
- Solanum nigrum* L. - T scap, Hi Others, Co
Rubble, ruins, sporadic.

Scrophulariaceae

- Veronica spicata* L. - H bienn. H Pvc, T-Eu

Clearings and ruins, sporadic.

Lauria pelosieriana (L.) Miller - T scap. Hi Ave, M-AI

Among the scrub; rare

Puccinellia pascua (L.) Cautel - T scap. Hi Ave, T-Eu

Temporary damp meadows among the scrub; frequent.

Ribwortia rivagei (L.) All. - T scap. Hi Ave, T-Eu

Clearings and edges of paths; frequent.

Orobanchaceae

Orobanche minor Sm. - T par. Hi, Others, SC'o

Parasite on *Helichrysum italicum* subsp. *microphyllum*; common.

Orobanche sacchara C. Presl - T par. Hi Others, M

Parasite on *Levinsium maritimum*; rare.

Plantaginaceae

Plantago coronopus L. subsp. *coronopus* - H ros. Hy, T-Eu

Meadows and paths; common.

Plantago coronopus L. subsp. *canariensis* (Guss.) Pölg. - T scap. Hy, M

Dry coastal subsalt meadows; frequent

Plantago macrochaeta Poiret - H ros. Hy, Meo

Sands of the harbour and western cliffs; frequent.

Plantago lanceolata L. - H ros. Hy, SC'o

Meadows and clearings of the scrub; frequent.

Plantago lagopus L. - T scap. Hy, T

Meadows near N. gne Baboe Cabiz; sporadic.

Plantago beillardii All. - T scap. Hy, T-Eu

Meadows and clearings of the scrub; sporadic.

Coprifoliaceae

Lonicera impleta A. J. C. - P. h. ar. WL, M-Ma

Among the scrub; sporadic.

Dipsacaceae

Dymalis fereola Cass. - B. bienn. Hi Ave, Meo

Near S. Giovanni's tower; rare.

Stachys angustifolia (L.) Greuter & Burdet subsp. *maritima* (L.) Greuter & Burdet - B

bienn. Hi P. v. M-Ma

Inland and coastal zones; sporadic

Pyrocremona orthoceras (Vahl) Hortikarst. & Link - B scap. Hi P. v. Meo

Sands of S. Giovanni di Suas and of Marina Mammia; frequent.

Campulacaceae

Campulacis crinis L. - T scap. Hi Ave, T-Eu

Dry meadows of the eastern sector, sporadic.

Compositae

Erigeron annuus L. - T scap. Hy. M-Ma

Meadows and temporary damp zones, common.

Hellis perennis L. - H ros. Hy. B-T

Among the scrub near the lighthouse, sporadic.

Aster squamatus (Sprengel) Hieron. - H scap. Hi Pes, Naturalized

In the damp depressions near the lighthouse; rare.

Helioscopia vulgaris Lam. - T scap. Hi Ave. T-Eu

Meadows and dry clearings; rare

Lagotis guthriei (L.) Casson & Germ. - T scap. Hi Ave. T-Eu

Edges of the paths and of the meadows near the lighthouse; common

Leucopogon (L.) Benth. - T rept. Hec. M-Ma

Meadows; common.

Poa asterisiflora (Lam.) Pers. - T rept. Hec. M

Along the path which leads to the western cliff; rare.

Helianthemum halimifolium (Roth) G. Don s. n. sp. *microphyllum* (Willd.) Nyman - Ch suffr.

WS. Ma

Coastal gorges; frequent.

Salvia subulnoides L. - Ch suffr. WS. M-Ar

Depressions and sandy and salt soils of the coast; frequent.

Dianthus caryophyllus (L.) W. Greuter - H scap. WS. M-Ma

In the harbour and among the rubble of the lighthouse; frequent.

Dianthus graveolens (L.) W. Greuter - T scap. Hi Ae. T-Eu

Clearings near the lighthouse; rare.

Palaemonia edera (L.) Reichenb. - M scap. Hi Pes. M

Among the scrub; common.

Polemonis saxatilis (L.) Moench - T scap. Hi Ave. M

Temporary damp meadows among the scrub; sporadic.

Asperula physandrioides (L.) Schur Bip. - H herm. Hi Pes. T-Eu

Near the isthmus and near S. Giovanni's tower; common.

Bidens biternata (L.) Hill - T scap. Hi Ave. M-Ma

Coastal gorges; sporadic

Anthemis arvensis L. - H scap. WS. Mes

Sandy zones; common. Some examples make suffrutescent hemispheres, low and almost crawling pulvines

Anthemis arvensis L. - T scap. Hi Ave. SGa

Meadows and clearings; frequent.

Anthemis semidifformis Benth. - T scap. Hec. Mes

Sands of the isthmus; frequent.

Ornithoglossum maritimum (L.) Theophrast. & Link. - Ch suffr. WS. M-Ma

Sands of the harbour and of the isthmus; frequent.

Chamaethamni coronarium L. - T scap. Hi Ave. M-Ma

Rubble and ruins of Tharros; common.

Colostoplos strobilata (L.) Reichenb. - T scap. Hi Ave. M-Ma

Meadows near the lighthouse; sporadic

Arctostaphylos uva-ursi L. - KP, WB, M

Abundant in the low scrub of the plateau between the lighthouse and N. gliè Bahz Cabita.

Senecio laccantherioides Poiret - T scap, Hec, M

Sandy and rocky coastal zones, common.

Senecio vulgaris L. - T scap, Hi Others, Co

Clearings and rocky meadows; sporadic.

Calandula arvensis L. - T scap, Hec, T Eu

Clearings and edges of the paths; sporadic.

Cordia coccinea L. - H scap, Hi Pvc, Eu-M

Meadows and clearings, common.

Cardua lanata L. - T scap, Hi Ave, M

Under S. Giovanni's tower; rare and localized.

Cardus laccinosa L. - T scap, Hi Ave, Mo

Among the scrub of the plateau; sporadic.

Atriplex canescens L. - H rose, Hec, M

Edges of paths and slopes; sporadic.

Cardus marianthus L. - T scap, Hi Ave, T-Eu

Among the ruins; sporadic.

Veronica agnus-castelli Cass. - T scap, Hi Ave, M-Ma

Among the *Diospyros* gatherings situated between S. Giovanni's tower and the ruins of Tharros; rare.

Galearia tamnifolia Moench - H burn, Hi Ave, T-Eu

Dry meadows, edges of the paths; common.

Oxyechia elatior L. - H scap, Hi Pvc, Mo

Between the ruins of Tharros and S. Giovanni's tower; frequent.

Centaurea calcitrapa L. - H scap, Hi Pvc, M-Ma

Clearings near S. Giovanni's tower; rare.

Silene aconitifolia (L.) Gaertner - H burn, Hi Ave, T-Eu

Rubble near the lighthouse; rare.

Centaurea calcitrapa L. - H burn, Hec, SCu

Paths and clearings; frequent.

Carduus tenuis L. - T scap, Hi Ave, T-Eu

To the east of S. Giovanni's tower; rare.

Carduus edulis (L.) U. Presl - H scap, Hi Pvc, M-Ma

Along the path in the north-west of the lighthouse; very rare.

Cichorium intybus L. - H scap, Hi Pvc, Co

Along the path which leads from the lighthouse to the harbour; rare.

Tolpis barbata (L.) Gaertner - T scap, Hi Ave, M-Ma

Paths among the scrub; rare.

Tolpis arguta Bertol. - H scap, Hi Pvc, M

Sands localized in the north of the Tophet of Tharros; frequent.

Hedysarum coccineum (L.) Dum. Cours. - T scap, Hec, T-Eu

Among the scrubs; common.

Crucianum subcapitatum (L.) Scop. - H scap, Hi Pvc, Eu-M

Meadows and clearings near the lighthouse; rare.

Crucianum perfoliatum (L.) Scop. - T scap, Hi Ave, T-Eu

Damp meadows among the scrub; rare.

Hypochaeris achyrophora L. - T scap, Ht Ave, M Ma

Among the low scrub; common.

Leontodon tuberosus L. - H ros, Hy, M

Among the scrub and at the edges of the paths; frequent.

Picris echioides L. - T scap, Ht Ave, T-Eu

Clearings and meadows near the lighthouse; rare.

Reichardia perardes (L.) Roth - H scap, Ht Others, M

Rocky fissures of the cliffs; common.

Aetheolaia bulbosa (L.) Cass. - G bulb, Htn, M-Ai

Clearings among the scrub and sandy zones; common.

Sanchar tenerrimus L. - T scap, Ht Others, SCu

Damp meadows among the scrubs of the plateau; rare.

Sapientia atracensis L. - T scap, Ht Ave, SCu

Among the walls of the lighthouse; sporadic.

Crepis cretensis L. subsp. *lychnalis* (Boiss.) Dabeneck - H ros, Ht Pre, Mco

Clearings in the south of the lighthouse; rare.

Crepis bellidifolia Loisel. - T scap, Hec, Mco

Dry meadows and clearings of the scrub; sporadic.

Anthysia integrifolia L. - T scap, Ht Ave, M-Ai

Rocky fissures and clearings of the scrub; rare.

Juncaginaceae

Triglochin inaeclerum Cass. - G bulb, Htn, M-Ai

Damp meadows among the scrub and near the lighthouse; frequent.

Posidoniaceae

Posidonia oceanica (L.) Delile - T rad, Htn, M

Rather wide sea-beds on the eastern side of the cape; common.

Liliaceae

Aphelandra squarrosa Vn. - G rhiz, Hrg, M

Among the scrub and near Torre Vecchia; frequent.

Oncotogonum convolvuloides Jord. et Born. - G bulb, Htn, Ew

Among the praxes situated in the west of Torre Vecchia; very rare (Garnati 1980).

Polyodonchus (Detl.) Steud. - G bulb, Htn, Mv

Numerous gatherings but localized in the clearings of the stream.

Crinum piperi (Moris) Steud. - G bulb, Htn, M

Clearings near the lighthouse; very rare.

Triglochin liliifolium (L.) Baker - G bulb, Htn, M-M

Present almost everywhere but not abundant.

Sella nutans L. - G bulb, Htn, Ew, M

Among the scrub; frequent.

Muscicula canopoda (L.) Miller - G bulb, Htn, T-Eu

Clayey, sandy meadows near Torre Vecchia; very rare.

Allium roseum L. - G bulb, Htn, T-Eu

Among the western scrub, sporadic. Some examples lack bulbils, while others with numerous bulbils can be attributed to var. *bulbiferum* DC.

Allium webbii Salzm. & Link. — G bulb, Hbu, M

Among the scrub, frequent.

Allium tripartitum L. — G bulb, Hbu, M-Mp

Low walls, edges of paths, hedgerows, frequent.

Allium cepeloprasum L. — G bulb, Hbu, T-Eu

Near the huts at S. Giovanni di Sines; sporadic.

Allium cuneolatum Guss. — G bulb, Hbu, M

Coastal rocky zones, frequent.

Asparagus arbus L. — Ch fruit, WS, Men

Abundant among the scrub and along the path which leads to the harbour.

Asparagus acutifolius L. — G rhiz, WS, Eu-M

Among the scrub, frequent.

Asparagus squarrosus L. — Ch fruit, WS, M

Western side of the cape and among the scrub, sporadic.

Asparagus striatus Forsk. — NP, WS, M-Ma

Near the Triplet of Tharros, rare.

Asparagus umbellatus L. — G rhiz, WS, T-Lu

Among the scrub, sporadic.

Sedum rosea L. — NP, WL, T-Eu

Among the scrub, common.

Amaryllidaceae

Narcissus tazetta L. — G bulb, Hbu, M

Along the coasts among the scrub, rare. The colour of the corolla is extremely variable.

Pancratium maritimum L. — G bulb, Hbu, M-M

Sands of the isthmus and of S. Giovanni, common.

Fidaceae

Gnaphalium stramonium (L.) Parl. — G bulb, Hbu, M

Coastal meadows, paths, & edges of the scrub, frequent.

Romulea ligustica Parl. — G bulb, Hbu, Men

Meadows of the glaucous, common.

Romulea teguensis Parl. — G bulb, Hbu, Ess

Meadows near the lighthouse, frequent.

Romulea rostrata Parl. — G bulb, Hbu, M

Slightly damp meadows among the scrub, sporadic.

Juncaceae

Juncus maritimus Lam. — G rhiz, Hri, SCo

Along the coast, rare.

Juncus acutus L. — H caesp, Hg, SCo

In the north of the Triplet of Tharros, frequent.

Juncus subulatus Forsk. - Cythz., Hu., T.

Damp depressions; rare.

Juncus hystrix L. - T caesp., Her., Co.

Damp meadows; frequent.

Juncus heloides Brot. - T caesp., Her., M-Ai

Sandy, sometimes coastal meadows; sporadic.

Citamineae

Festuca arundinacea Schreb. subsp. *lunata* (Lag.) Arcangel. - H caesp., Hg Pvc., Eu-M

Along a path near the lighthouse; extremely rare.

Festuca pycnantha L. - H caesp., Hg Pvc., SCu

East T sector of the cape; sporadic.

Festuca ovina L. - T scap., Hg Ave., T-Eu

Edges of the paths among the scrub; sporadic.

Vulpia geniculata (L.) Link. - T caesp., Hg Ave., M-Ma

Inland meadows among the scrub; frequent.

Vulpia fasciculata (Forsk.) Samp. - T caesp., Hg Ave., M-Ai

Sands of the isthmus, of S. Giusanni di Sini and of Murru Mannu; frequent.

Vulpia myuros (L.) C. C. Gillet. - T caesp., Hg Ave., SCu

Dry meadows among the low scrub; frequent.

Vulpia ciliata Dumort. - T caesp., Hg Ave., T-Eu

Among the scrub; rare.

Deschampsia aspera (L.) Dumort. - T scap., Hg Ave., M-Co

Coastal, sandy, clayey meadows; frequent.

Deschampsia flexuosa (L.) Drake - T scap., Hg Ave., M-Ai

Meadows and rocky coastal fringes; common.

Deschampsia cespitosa (L.) Villm. - T scap., Hg Ave., T-Eu

Dry meadows, paths, clearings of the scrub; common.

Cymbella maritima (L.) W. Bullock - T scap., Hg Ave., M-Ma

Sands of the isthmus; frequent.

Cymbella deserticola (Desf.) Ascherson - T scap., Hg Ave., Men

Sands of the isthmus and of Murru Mannu; sporadic.

Poa annua L. - T scap., Hg Others., Co

Inland meadows among the scrub; frequent.

Poa alpina Kunth - T caesp., Hg Ave., M-Ai, coastal

Coastal, clayey and somewhat salty meadows; frequent.

Poa bulbosa L. - H caesp., Hg Pvc., T-Eu

Central plateau of the cape; sporadic.

Deschampsia glauca L. subsp. *frigida* (Roth) Nyman - H caesp., Hg Pvc., Eu-M

Coastal zones, inland meadows, scrub; common.

Cynosurus echinatus L. - T scap., Hg Ave., T-Eu

Meadows and clearings; common.

Cynosurus rigens Link. - T scap., Hg Ave., T

Meadows near the harbour; sporadic.

Setaria maritima L. - T scap., Hg Ave., Co

Edges of the paths, meadows; frequent.

Monarda annua L. fide *M. arvensis* G. Kuntze - H caesp., Hg Pvc., Men

Rocky fissures; scrub; sporadic.

Alcea collina L. subsp. *magnoliifolia* (Guss.) Cusani & Husnot - H caesp. Hg Pve. M

Among the low scrub; frequent.

Bromus rigidus Roth - T scap. Hg Ave. T Eu

Among the scrub of the plateau; rare.

Bromus tectorum L. - T scap. Hg Ave. O

Near the lighthouse; rare.

Bromus madagascariensis L. - T scap. Hg Ave. T-Eu

Meadows of the harbour; frequent.

Bromus hordeaceus L. subsp. *madagascariensis* (Lloyd) Maire & Werker - T scap. Hg Ave. Eu M

Scrub and clearings; sporadic.

Brachypodium chalcidii Beauv. - H caesp. Hg Pve. M

Among the scrub; common.

Brachypodium distachyon (L.) Beauv. - T scap. Hg Ave. T

Clearings and meadows; sporadic.

Elymus farctus (Vic.) Rungtark - G. b. Hg Pve. M

Sands of the isthmus, of S. Giovanni di Siris and of Minio Mannu; frequent.

Aegilops centroura Euseb. - T scap. Hg Ave. M eu

Among the scrub; rare.

Aegilops geniculata Roth - T scap. Hg Ave. T

Meadows and clearings; sporadic.

Dactyloctenium aegyptium (L.) P. Candargy - T scap. Hg Ave. T-Eu

Between S. Giovanni tower and the ruins of Tharros; frequent.

Hordium murinum L. subsp. *leporinum* (Link) Arzuffe - T scap. Hg Ave. T-Eu

Meadows and edges of paths; common.

Hordium maritimum Hudson - T scap. Hg Ave. T-Eu

Coastal, somewhat salty meadows; sporadic.

Avena barbata Pott - T scap. Hg Ave. T-Eu

Meadows, edges of paths, clearings of scrub; common.

Avena sterilis L. - T scap. Hg Ave. T-Eu

Clearings of the scrub and rocky fissures; sporadic.

Composita longilis (L.) Beauv. - T scap. Hg Ave. Eu-M

Temporary damp meadows of the plateau; rare.

Leptochloa curvata (L.) Hyll. - T caesp. Hg Ave. SC eu

Clearings and edges of paths; common.

Leptochloa myrtillo (Sav.) Chase L. - T scap. Hg Ave. M

Damp and muddy meadows among the scrub; rare.

Leptochloa puberula (Lam.) H. Scholz - T scap. Hg Ave. M

Sands of the isthmus and of Minio Mannu; common.

Lycopus ovalis L. - T scap. Hg Ave. M-A

Frequent aliso-everywhere.

Alopecurus phyllis L. - T scap. Hg Ave. O-Pt

Meadows and clearings; frequent.

Alopecurus pratensis Guss. - T scap. Hg Ave. M

Meadows near Torre Vecchia; common.

Caryophyllus thymoides (Pamp.) Breistr. - T scap. Hg Ave. M

Among the sands of the isthmus and at the foot of S. Giovanni's tower; frequent.

Gentridium ventricosa (Gouan) Schinz & Thell. - T scap., Hg Ave., T Eu

Among the scrubs and at the edges of the temporary damp meadows; sporadic.

Polypogon monspeliensis Willd. - T scap., Hg Ave., T-Ai

Meadows and coastal fissures; sporadic.

Anomophila acutata (L.) Link. ssp. *acutata* or *A. Lindb.* fl. - Grluz., Hg Pse., M

Sands of the isthmus and of S. Giovanni di Sinis; sporadic.

Parapholis caerulea (L.) C. T. Hubbard - T scap., Hg Ave., T-Ai

Sandy coastal meadows; common.

Hainardia extensifolia (Weild.) W. Greuter - T scap., Hg Ave., T-Eu

Edges of the paths and trampled grass; sporadic.

Phalaris aquatica L. - H caesp., Hg Pse., T-Eu

Temporary damp meadows of the scrub; rare.

Phalaris paradoxa L. - T scap., Hg Ave., M-Ma

Edges of paths and of clearings; sporadic.

Pipturis caespitosa (L.) Cosson - H caesp., Hg Pse., T

Among the scrub of the eastern side of the cape; sporadic.

Pipturis caespitosa (L.) Beauv. - H caesp., Hg Pse., M-Ma

Among the scrub of the eastern side; very rare.

Suaeda frutescens (Thunb.) - T scap., Hg Ave., T

Dry and rocky meadows; sporadic.

Phragmites australis (Cav.) Trin. - Grluz., Hg Pse., SCu

In a marsh at the west of the Tophet of Tharros; localized.

Sporobolus paezani (Scarlach.) Kunth - Grluz., Hg Pse., M-Ma

Sands of the isthmus and of S. Giovanni di Sinis; frequent.

Cymbopogon flexuosus (L.) Pers. - Grluz., Hg Pse., Cu

Meadows, edges of paths; common.

Palmae

Chamaecyparissus L. - NP, WB, MCo

Among the scrub of the plateau and along the cliffs of the western side; frequent.

Araceae

Arisaema pictum L. fil. - Grluz., Hlu, Lino

Among the ruins of Tharros, rubble, under *Euphorbia terrae-arvensis* bushes and near S. Giovanni's tower; common.

Arisaema vulgare Turp. - Grluz., Hlu, M-M.

Common everywhere.

Cyperaceae

Sclerurus holzschuhius L. - Grluz., Hlu, SCu

Little nephelium and temporary damp grobs; sporadic.

Cyperus capillatus Vandelb. - Grluz., Lri, T-Ai

Sands of the isthmus; frequent.

Schweitzeria nigricollis L. - H caesp., Hce, SCu

Damp meadows of the plateau; sporadic.

Carex flacca Schreber subsp. *terrestris* (Bret. & W. Greuter) Colmez, Her. T. Eu.

Dry meadows, edges of paths and slopes; frequent.

Carex pumila (Coud.) H. v. d. Sp. Her. T. Eu. (terrestrial)

Among the coastal scrub; sporadic.

Carex bulleriana Asso - H. v. d. Sp. Her. O.

Dry clearings and meadows; sporadic.

Orchidaceae

Ophrys reticulata L. subsp. *fragrans* (Pollard) Sudjir - G. bulb. Her. T. Eu.

Among the low scrub of the plateau; rare.

Scirpus pectinifera Park. - G. bulb. Her. M-Ma.

Among the scrub near the lighthouse; sporadic.

Ophrys corymbosa Benth. (= *O. speciosa* Link.) - G. bulb. Her. M.

Among the scrub; rare.

Ophrys latens (Ciccarini) Cav. - G. bulb. Her. T.

Among the scrub of the plateau; rare.

Conclusions

During researches at Capo S. Marco 400 spontaneous taxa were found, belonging to 64 families and 242 genera. This is a considerable number for an area of about 1 square km, where there are archaeological ruins, settlements and some military operations. The systematic details subdivision of the 400 entries is shown in Table 1.

Table 1. Systematic subdivision of the flora of Capo S. Marco.

	Families	Genera	Species	Subspecies	Varieties
<i>Pteridophyta</i>	2	2	2	-	-
<i>Gymnosperms</i>	2	2	2	-	-
<i>Dicotyledonae</i>	48	172	275	19	1
<i>Monocotyledonae</i>	11	59	60	11	-

Table 2. Number of genera, species and subspecies of the most numerous families of the flora of Capo S. Marco.

	Genera	Species	Subspecies	Total
<i>Gramineae</i>	23	50	7	80
<i>Compositae</i>	41	57	2	100
<i>Leguminosae</i>	17	41	4	62
<i>Umbelliferae</i>	11	13	3	27
<i>Caryophyllaceae</i>	9	19	1	29
<i>Labiales</i>	9	18	-	27

The floristic list also shows the families with the largest number of taxa (Table 2). Only a small number of endemics were found, as also observed at Capo Trapani, Capo Marone

and Torre del Sevo. Amongst the 12 endemics, six are restricted to Sardinia, four are Sardinian-Corsican and the others have a distribution which includes also the Balearic Islands, the Tuscan Archipelago and Sicily. *Limonium capitis-aurei* Arrigoni & Diana, *Limonium junciforme* Pignatti and *Limonium disco-stemum* Arrigoni & Diana have their *lecto* -clustins at Capo S. Marco. Other species are remarkable phytogeographic significance, and are threatened with extinction by the fragility of the ecosystem where they occur: *Cuscutaria corinthiana* L., *Ephedra distachya* L., *Silene acaulis* DC. and *Silene aemula* Valsecchi.

The analysis of the biological spectrum (Table 3), compared also with that one of other Sardinian capes, shows the high percentage of annual species, due to the remarkable annual dry period of about four months. We see a certain analogy in the response of the plants to the same environmental factors with the near Capo Mannu and Capo Frasca and, for some values, also with Capo Bellavista, situated on the same latitude in central-eastern Sardinia.

Table 3. Biological spectrum of Capo S. Marco compared with the general one of Sardinia and with other capes of the island

	No. taxa	T%	H%	O%	O%	P%	R%
Capo S. Marco	400	52.6	19.1	11.5	9.1	7.5	0.2
Capo Frasca (Bocchieri & Molis 1992)	517	51.7	18.9	13.6	4.7	7.9	3.3
Capo Bellavista (Bocchieri 1990)	318	53.8	19.5	9.4	5.9	12.3	-
Capo Teulada (Ballerio & Bocchieri 1987)	466	45.5	21.6	18.9	7.2	9.4	1.1
Capo Carbonara (Camarda & Bafaro 1981)	321	49.5	24.6	12.6	5.6	7.5	-
Capo S. Elia (Mariani 1960)	547	45.0	30.0	13.0	6.0	6.0	-
Capo Caccia (Valsecchi 1965)	231	45.0	23.9	10.4	5.2	10.4	-
Capo Mannu (Bocchieri & al. 1988)	445	50.9	17.0	13.4	9.5	7.2	1.6
Sardinia (Bocchieri 1994)	2064	39.9	26.1	12.1	6.1	8.8	3.0

In order to make a better analysis of the response of the plants to the environmental factors, we have taken into consideration the different growth forms proposed by Arrigoni & Di Tommaso (1991) and quoted in Table 1. Their percentage of the flora shows the great number of herbaceous taxa (321), containing 220 species, which have an annual cycle (66.3%) and 112 (33.7%), which have a biennial or perennial cycle. Amongst the annual species, those which have a winter growth cycle are dominant and, as already reported by Arrigoni & Di Tommaso (1991), the open and low vegetative formations are the most frequent at Capo S. Marco. Also, among the herbaceous perennial grasses and sedge species, the winter species predominate over the summer species. In the whole, one can observe that the different growth forms which have been found generally reflect the biological forms reported in Table 3.

Table 4. Distribution spectrum of the growth forms in the flora of Capo S. Marco

Growth form	No.	Annual					Perennial									
		All	AE	AF	AS	AL	AE	AF	AS	AL	AE	AF	AS	AL	AE	AF
AE	2	2	18	8	28	1	46	5	22	7	10	41	11	2	1	1
AF	10	14	17	22	40	10	20	12	42	0	10	18	23	23	17	23

A further analysis of the flora of Capo S. Marco has been carried out applying Takhtajan's phytogeographical units (Takhtajan 1986) and, as regards the European Mediterranean area, the subdivisions proposed by Arrigoni (1983). Therefore, it has been necessary to know, for each entry, the areal of distribution which has been extrapolated using the works of Meusel & Weinert (1965), Meusel & Jager (1992), Meusel & al. (1978), Juras & Suominen (1972-1991) and the principal florists, which report chorological data. In this way, it has been possible to ascribe to each entry to its own geographical element, indispensable condition to construct the scheme of Fig. 3, which graphically shows the different geographical components of the flora of Capo S. Marco.

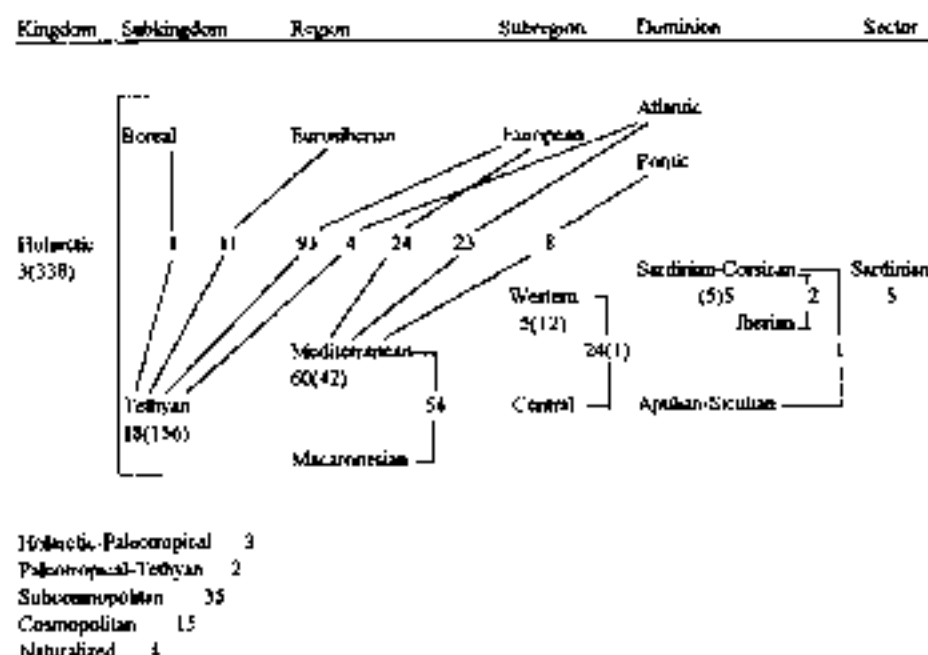


Fig. 3. Geographical components of the flora of Capo S. Marco.

This figure shows the limited presence of polycentric species (cosmopolitan and subcosmopolitan) and the high percentage of typically Mediterranean species (25%) which, in addition to those connected to other regions, exceed the 60% of the whole floristic component. For the geographical position of Sardinia, the connecting species between the Tethyan subkingdom and the European region are particularly numerous.

Therefore, the scheme of Fig. 3 permits the attribution of the flora of Capo S. Marco to the Mediterranean region with a prevalence of central-western elements. One also observes that within the Tethyan subkingdom the Macaronesic region is the one which it shows more phytogeographical affinity with.

As regards the floristic sector (Sardinian sector), this territory has a remarkable number of endemic species which, according to Arrigoni (1983), contribute to characterize the coastal and lilly subsector of Sardinia. Besides the endemic species with a wider

distribution area are many of the western subregion and in particular of the Sardinian Corsican axis.

Within the area of Capo S. Marco, there are many plants which are restricted to one habitat and which could be included among the different ecological elements proposed by Arrighi (1983) for the Sardinian flora.

The psammophilous, rupicolous and thermo xerophilous elements of the scrub and coastal garrigue characterize the vegetation of Capo S. Marco and represent about 50% of the flora.

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