THE FLORA AND VEGETATION OF GOZO

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The Maltese Islands lie in the centre of the Mediterranean. The highest points for the two main islands are only 253 m (Ta' Zuta, Malta) and 191 m (Dbiegi, Gozo) above sea level. Therefore, as is to be expected, this archipelago is subjected to the typical climatic regime which is characteristic of low-lying coastal Mediterranean areas. Typical Mediterranean climate is characterised by the alternation of a warm dry season and a wet cool season. In the case of the Maltese Islands the dry season starts around the beginning of May and persists till about mid-September, when it gives way to the wet season. Temperatures are not extreme, rarely exceeding 40°C or descending below 3°C for more than a few days. Grass temperatures may occasionally descend to a few degrees below freezing. Most rainfall precipitates in the first half of the wet season and, in the Maltese Islands, averages between 500-600 mm annually with extremes of between 190 mm and 1030 mm. For more detailed meteorological information see Chetcuti *et al.* (1992).

Mediterranean vegetation is adapted to flourish in this particular climatic regime where the main limiting factor is water availability. Thus to survive successfully in a typical Mediterranean habitat, plants must be able to cope with long periods of drought coupled with brief episodes of torrential rains. Another factor which determines the nature of the vegetation of an area is the chemical composition of the soil. Since the Maltese Islands consist almost entirely of limestones, the soils are consequently calcareous. This means that only plants which tolerate or prefer such soils can flourish.

Maltese Vegetation

The type of vegetation which is most characteristic of the Mediterranean

area, and hence also of the Maltese Islands, is what can be referred to as the *sclerophyll* series. The highest expression of this type of vegetation is the evergreen wood dominated by trees such as Aleppo Pine (*Pinus halepensis*) and Evergreen Oak (*Quercus ilex*). These typically form a dense canopy and undergrowth is usually poor. Within the past few hundreds of years, this type of community has been destroyed from the Maltese Islands; only small patches of Evergreen Oak persisting to remind us of its former existence. At a lower level is the maquis which is characterised by a variety of large shrubs and small trees, examples being the Carob (*Ceratonia siliqua*), Olive (*Olea europaea)* and Lentisk (*Pistacia lentiscus*) trees accompanied by woody climbers such as Ivy (*Hedera helix*) and Sarsaparilla (*Smilax aspera*), and an undergrowth of large herbaceous plants. At a still lower level is the garrigue, typical of karstlands, which is dominated by low (less than one metre) hemispherical shrubs such as the Mediterranean Thyme (*Thymus capitatus*) and Mediterranean Heath (*Erica multiflora*) which, in the wet season, are accompanied by a large variety of herbaceous species. When no shrubs are present, a steppe community forms. The four communities which make up this sclerophyll series are actually steps in a succession and are therefore interchangeable, depending on the factors which affect the environment.

In addition to the sclerophyll series there exist other communities specialised to exist in particular environmental conditions. These include saline wetlands, freshwater wetlands, coastal sands, transitional coastal habitats and cliffs. Furthermore, due to heavy anthropic pressures, communities peculiar to disturbed habitats, which are often dominated by alien and other opportunistic species, are particularly widespread.

Vegetation and Flora of Gozo

As is to be expected the flora and vegetation of Gozo is essentially similar to that of Malta. Nonetheless some rather subtle differences exist. Some species present in Malta have not been recorded from Gozo and vice versa. Some species are also more frequent in Gozo than in Malta. Literature specific to Gozitan vegetation and flora is scant but several references can be traced in works dealing with the flora of the Maltese

Islands in general such as Sommier and Caruana Gatto (1915), Borg (1927), Haslam *et al.* (1977) Lanfranco (1989) and Lanfranco (1995). Some more specific references are available in works such as Gulia (1874), Duthie (1872, 1874, 1875a, 1875b), Kramer *et al.* (1972), Lanfranco (1980), Lanfranco (1981a, 1981b), Lanfranco [G.] (1983), Lanfranco (1985), Schembri *et al.* (1987), Brullo and Pavone (1988) and Tabone (1995).

The present work is mainly intended to give an overview of some special features which characterise the Gozitan vascular flora.

Species Confined to Gozo

Several species reported from the Maltese Islands have been recorded only from Gozo, or have their last outpost in Gozo. Most of these are very rare or even extinct. These are listed in Appendix A. Of the species so confined, the most significant is Maltese Everlasting, *Helichrysum melitense*, which is confined to the cliffs of western Gozo, particularly the Dwejra area and including Fungus Rock (which, for the purposes of this work, is being regarded as part of Gozo). Records also exist from Malta (at Wied Babu) from where it has possibly disappeared. This species is endemic and is related to a cluster of other *Helichrysum* taxa occurring in Sicily and associated islands (Pignatti, 1979).

Of the others the most important are the Shrubby Campion, *Silene fruticosa*, an eastern Mediterranean species, of which very small populations persist at Wied Mġarr ix-Xini and Wied ix-Xlendi, and *Pteranthus dichotomus*, a North African and Levantine species for which Malta seems to be the only European station. This was first recorded at Marsa (island of Malta) by Grech Delicata (1853) and subsequently by Gavino Gulia (Sommier and Caruana Gatto, 1915) from Chambray (Gozo). It was not seen again until recently (Tabone, in preparation) when it was rediscovered in Gozo not far from Chambray.

Mention should also be made of the Christ's Thorn, *Paliurus spina-christii*, first discovered at the bottom of Wied ix-Xlendi (Sommier and Caruana Gatto, 1915) which was seen again in the late 1970s by L.Y.Th. Westra (personal communication) in much the same place, but subsequent efforts to relocate it have, so far, been unsuccessful. Bracken Fern,

***Helichrysum melitense*, which is confined to the cliffs of western Gozo.**

Pteridium aquilinum, geographically a very common, sometimes noxious, species is locally confined to the Rdum il-Kbir area of Gozo where it has not been seen for several decades and may possibly be extinct, although the occasional specimen may crop up as a weed; in fact the author has met it twice at Sliema (island of Malta)!

Ramla l-Ħamra, a sand dune habitat, is the least spoilt of the remaining coastal sandy communities in the Maltese islands and has recently been covered by protective regulations. This is the last refuge of a number of typical dune species which, until quite recently, also existed in dune communities in the island of Malta, particularly at Ramla tat-Torri. Thus *Pseudorlaya pumila*, *Euphorbia paralias* and *Echinophora spinosa* now seem confined to this locality while *Ononis variegata* has never been recorded from any other Maltese dune.

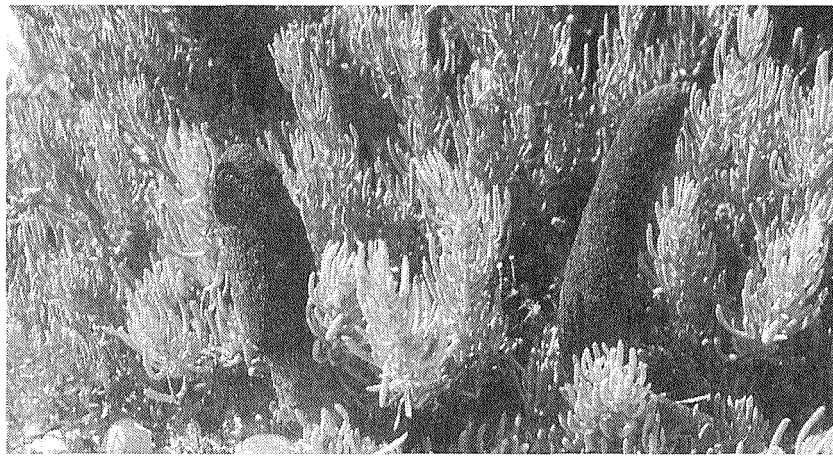
Other Species

Possibly the best known plant with Gozitan connections is the so-called "Malta Fungus". Of course this is not a fungus at all, but had been mistaken for one owing to its strange shape. It is actually a parasitic vascular plant which absorbs nutrients from the roots of a number of

coastal plants. Originally it was known to exist only on General's Rock, thence also known as "Fungus Rock" and it was carefully harvested by the Knights of Malta as an item of commerce or exchange (Lanfranco [G.G],1961). However it was later discovered on the mainland of both Gozo and Malta as well as in various other sites in the Mediterranean region. Nevertheless, in the Maltese Islands, it remains an endangered species.

A very important site, now floristically impoverished, was provided by some parts of the Citadel which, until recently, used to be a refuge for some extremely rare species (Lanfranco, 1981a; 1981b). Restoration works have been responsible for the disappearance of a number of species from the site. Thus, Golden Chamomile, *Chamomilla aurea*, is now probably extinct from the Maltese Islands while Grey Hare's ear, *Bupleurum semicompositum*, may be extinct from Gozo and is currently known from just one site from the island of Malta. Maltese Star-Thistle *Centaurea melitensis* and Maltese Toadflax *Linaria pseudolaxiflora* have disappeared from the Citadel and, locally, both species are rapidly declining in numbers. Maltese Toadflax is actually endemic to the Maltese Islands and Linosa in the Pelagian Islands; large populations of this species which existed also at Dwejra (Gozo) seem to have disappeared. In spite of persecution, the endemic Maltese Salt-Tree, *Darniella melitensis*, a large succulent shrub, persists vigorously on the ramparts of the Citadel.

Cliff habitats are particularly important in the Maltese Islands since they harbour a large proportion of the endemic and other relict species. This is also true for the Gozitan cliffs. The endemic rupestral flora includes two monospecific genera, *Cremnophyton* and *Palaeocyanus*, both occurring also in Gozo. Good populations of Maltese Cliff-Orache, *Cremnophyton lanfrancoi* occur on the western and southern cliffs of Gozo while Maltese Rock-Centaury, *Palaeocyanus crassifolius* (Malta's "National Plant") is rarer in Gozo than in Malta. Other rupestral species of note are *Helichrysum melitense*, now confined to Gozo (see above), and the Maltese Stocks *Matthiola incana* subsp. *melitensis* which is much more widespread in Gozo than in Malta. Similarly, the Gozo Hyoseris, *Hyoseris frutescens*, was, until recently, thought to be confined to Gozo, but two small populations have now been found on the island of Malta. The large shrubby Maltese Salt-Tree, *Darniella melitensis*, is one of the



***Cynomorium coccineum* at Fungus Rock, Gozo.**

most frequent rupestral species in the Maltese Islands; nevertheless plants in Gozo often attain a large size, up to some four metres. Other notable, though not endemic, cliff species are the Southern Tea-Tree, *Lycium intricatum*, a very rare species, and Cliff Groundsel, *Senecio leucanthemifolius* which is more widespread on the cliffs of Gozo and Comino than on those of the island of Malta.

Few indigenous trees exist on Gozo and no records of native Evergreen Oaks, *Quercus ilex* and Aleppo Pines, *Pinus halepensis* exist, the same applies to some trees of moist habitats such as Grey-leaved Elm, *Ulmus canescens*, White Willow, *Salix alba* and Mediterranean Willow, *Salix pedicellata*, all of which are also rare or even endangered on the island of Malta. Nevertheless two small trees or large shrubs, the African Tamarisk, *Tamarix africana*, and the Chaste-Tree, *Vitex agnus-castus*, which are very rare in the island of Malta, and in Comino, are quite widespread in Gozo.

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APPENDIX A: PLANTS FOUND IN GOZO BUT NOT IN MALTA OR COMINO

Ferns

Family: *Hypolepidaceae*

Pteridium aquilinum (L.) Kuhn
[RDB:8; endangered, perhaps already extinct]†

Dicotyledons

Family: *Apiaceae (=Umbelliferae)*

**Echinophora spinosa* L.
[RDB:25; endangered (Gozo), possibly extinct (Malta)]

**Pseudorlaya pumila* (L.) Grande
[RDB:25; endangered (Gozo), possibly extinct (Malta)]

† RDB = *Red Data Book* for the Maltese Islands (Schembri and Sultana [eds.], 1989). Number following RDB refers to page reference. Frequency status in increasing order of rarity: very common, common, frequent, rather frequent, uncommon, scarce, rather rare, rare, very rare, vulnerable, endangered, extinct. Clearly alien species are excluded.

* Recorded also from the island of Malta where they are now probably extinct.

Family: *Asteraceae (=Compositae)*
**Helichrysum melitense* (Pignatti) Brullo, Lanfranco, Pavone and Ronsisvalle
[RDB:35; ENDEMIC, very rare (Gozo), possibly extinct (Malta)]

Family: *Brassicaceae (= Cruciferae)*
Brassica tournefortii Gouan
[Reported by Duthie (1875b) but records cannot be confirmed]
Matthiola lunata DC.
[RDB:16; possibly extinct, last seen in 1957]

Family: *Caryophyllaceae*
**Pteranthus dichotomus* Forsskal
[RDB:13; vulnerable (Gozo), possibly extinct (Malta)]
Silene fruticosa L.
[RDB:13; endangered]

Family: *Euphorbiaceae*
**Euphorbia paralias* L.
[RDB:21; endangered (Gozo), possibly extinct (Malta)]

Family: *Fabaceae (= Leguminosae)*
Hymenocarpus circinnatus (L.) Savi
[RDB:18; vulnerable]
Ononis oligophylla Tenore
[RDB:19; vulnerable]
Ononis variegata L.
[RDB:19; endangered]
**Trifolium squamosum* L.
[RDB:20; very rare (Gozo), possibly extinct (Malta)]

Family: *Rhamnaceae*
Paliurus spina-christii Miller
[RDB:22; endangered]

Family: *Rosaceae*
Mespilus germanica L.
[RDB:17; possibly extinct]

Monocotyledons

Family: *Alliaceae*
Allium arvense Gussone
[RDB:39; very rare]

Family: *Cyperaceae*
Eleocharis ovata (Roth) Roemer and Schultes
[RDB:47; very rare]

Family: *Poaceae (=Graminae)*
Crypsis schoenoides (L.) Lamarck [recently discovered (Tabone, 1995); endangered]
Echinaria capitata (L.) Desfontaines
[RDB:43; possibly extinct]

APPENDIX B: OTHER GOZITAN SPECIES OF FLORISTIC IMPORTANCE

Ferns

Family: *Aspleniaceae*
Asplenium marinum L.
[RDB:8; possibly extinct (Gozo and Malta)]
Asplenium trichomanes L.
[RDB:8; possibly extinct (Gozo and Malta)]
Asplenium sagittatum (DC.) A.J. Bange
[RDB:9; endangered, perhaps extinct (Gozo and Malta)]

Dicotyledons

Family: *Apiaceae (= Umbelliferae)*
Bupleurum semicompositum L.
[RDB:25; possibly extinct (Gozo), endangered (Malta)]

Family: *Asteraceae (=Compositae)*
Anthemis urvilleana (DC.) Sommier and Caruana Gatto
[RDB:33; ENDEMIC, not threatened]

Atactylis Cancellata T.
[RDB:33; very rare (Gozo and Malta)]
Centaurea melitensis L.
[RDB:34; scarce (Gozo), rare (Malta, Comino, Selmunett)]
*Chamomilla aurea (*Loefling) Gay ex Cosson and Kralik
[RDB:34; probably extinct (Gozo and Malta)]
Chiliadenus bocconei Brullo
[RDB;34; ENDEMIC, not threatened]
Chrysanthemum segetum L.
[RDB:34; uncommon (Gozo), very rare (Malta)
Crepis pusilla (Sommier) Merxmüller
[RDB:35; possibly extinct (Gozo), very rare (Malta)]
Hyoseris frutescens Brullo and Pavone
[RDB:35; ENDEMIC, uncommon (Gozo), vulnerable (Malta)]
Onopordum argolicum Boissier
[RDB:35; uncommon (Gozo, Comino), rare (Malta)]
Palaeocyanus crassifolius (Bertoloni) Dostal
[RDB:35; ENDEMIC, very rare (Gozo), rather rare (Malta)]
Scorzonera laciniata L.
[frequent (Gozo), scarce (Malta)]
Senecio leucanthemifolius Poiret
[RDB:36; uncommon (Gozo, Comino, Filfla), rare (Malta)]

Family: *Boraginaceae*
Echium sabulicola Pomel
[endangered (Gozo), extinct (Malta)]

Family: *Brassicaceae (=Cruciferae)*
Hymenolobus revellieri (Jordan) Brullo subsp. *sommieri* (Pampanini) Brullo
[RDB:15; endemic to circum-Sicilian islands, possibly extinct (Gozo); endangered (Comino), absent from island of Malta]
Matthiola incana (L.)R.Br subsp. *melitensis* Brullo, Lanfranco, Pavone, Ronsisvalle
[RDB:16; ENDEMIC, rare (Gozo), very rare (Malta)]

Family: *Caprifoliaceae*
Sambucus ebulus L.
[RDB:32; uncommon (Gozo), rare (Malta)]
Sambucus nigra L.
[scarce (Gozo), very rare (Malta), probably introduced and also cultivated]

Family: *Chenopodiaceae*
Cremnophyton lanfrancoi Brullo and Pavone
[RDB:12; ENDEMIC, rare (Gozo and Malta)]
Darniella melitensis (Bochantzev) Brullo
[RDB:12; ENDEMIC, not threatened, largest specimens occur in Gozo]

Family: *Cistaceae*
Cistus creticus L.
[RDB:23; very rare (Gozo), rare (Malta)]
Cistus monspeliensis L.
[RDB:23; very rare (Gozo and Malta)]

Family: *Convolvulaceae*
Convolvulus lineatus L.
[rather frequent (Gozo); uncommon (Malta)]
Convolvulus oleifolius Desrousseaux
[RDB:28; restricted Mediterranean distribution, rather frequent (Gozo and Malta)]

Family: *Cynomoriaceae*
Cynomorium coccineum L.
[RDB:24; endangered (Gozo: General's Rock and Malta)]

Family: *Elatinaceae*
Elatine gussonei (Sommier)Brullo, Lanfranco, Pavone and Ronsisvalle
[RDB:24; Pelago-Maltese endemic, rare (Gozo and Malta)]

Family: *Euphorbiaceae*
Euphorbia characias L.
[RDB:21; very rare (Gozo and Malta)]
Euphorbia melitensis Parlatore
[RDB:21; ENDEMIC, not threatened, important component in Gozo garigues]
Euphorbia peplis L.
[RDB:22; endangered (Gozo and Malta)]
Euphorbia terracina L.
[RDB:22; vulnerable (Gozo and Malta)]

Family: *Fabaceae (=Leguminosae)*
Coronilla valentina L.
[very rare (Gozo), uncommon (Malta)]
Medicago monspeliaca (L.) Trautvetter
[rather frequent (Gozo, Comino), uncommon (Malta)
Ononis mitissima L.
[frequent (Gozo), uncommon (Malta)]
Ononis natrix L.
[frequent (Gozo), uncommon (Malta)]
Spartium junceum L.
[RDB:20; possibly extinct (Gozo), endangered (Malta), also in cultivation]

Family: *Lamiaceae (=Labiatae)*
Stachys ocymastrum (L.) Briquet
[RDB:30; uncommon (Gozo); rare (Malta)]

Family: *Plantaginaceae*
Plantago albicans L.
[RDB:32; probably extinct (Gozo and Malta)]

Family: *Scrophulariaceae*
Linaria pseudolaxiflora Lojacono
[RDB:31; Pelago-Maltese endemic, rare (Gozo, Comino), very rare (Malta, Selmunett, Kemmunett), on the decrease]

Family: *Solanaceae*
Lycium intricatum Boissier
[RDB:31; rare (Gozo), very rare (Malta)]

Family: *Tamaricaceae*
Tamarix africana Poiret
[RDB:23; rather rare (Gozo, Comino); virtually extinct in the island of Malta where most plants appear to originate from cultivated stock.

Family: *Urticaceae*
Parietaria lusitanica L.
[RDB:11; rare (Gozo and Malta)]

Family: *Verbenaceae*
Vitex agnus-castus L.
[RDB:29; uncommon (Gozo), rare (Malta, Comino)]

Monocotyledons

Family: *Alismataceae*
Damasonium bourgaei Cosson
[RDB:36; vulnerable (Gozo and Malta), restricted Mediterranean distribution]

Family: *Alliaceae*
Allium lojaconoi Brullo, Lanfranco and Pavone
[RDB:39; ENDEMIC, uncommon (Gozo and Malta)]
Allium commutatum Gussone
[RDB:39; giant form, possibly similar to that of Filfla, occurs on General's Rock]
Allium melitense (Sommier and Caruana Gatto) Ciferri and Giacomini
[RDB:39; ENDEMIC (?), rather frequent, possibly a variant of *Alllium commutatum*]

Family: *Aloeaceae*
Aloe vera (L.) Burmann fil.
[RDB:38; vulnerable, doubtfully native but Gozo populations grow in very natural settings and possibly long naturalised]

Family: *Cyperaceae*
Bolboschoenus maritimus (L.) Palla
[RDB:47; scarce (Gozo), very rare (Malta)]
Cyperus capitatus Vandelli non Burmann
[RDB:46; vulnerable (Gozo and Malta), populations decreasing rapidly]
Cyperus fuscus L.
[RDB:47; endangered (Gozo and Malta)]

Family: *Dioscoreaceae*
Tamus communis L.
[RDB:40; scarce (Gozo), very rare (Malta)]

Family: *Hyacinthaceae*

Scilla sicula Tineo
[RDB:38; endemic to Sicily, Calabria and Maltese Islands; rather rare (Gozo), scarce (Malta and Comino)]

Family: *Iridaceae*

Iris pseudopumila Tineo
[RDB:41; endemic to Sicily, Puglia and Maltese Islands; vulnerable (Gozo and Malta), each population bears a distinctive character]
Iris sicula Todaro
[RDB:41; Siculo-Maltese endemic, vulnerable (Gozo and Malta)]

Family: *Orchidaceae*

Anacamptis urvilleana Sommier and Caruana Gatto
[RDB:47; ENDEMIC, rare (Gozo), scarce (Malta)
Neotinea maculata (Desfontaines) Stearn
[RDB:48; probably extinct (Gozo and Malta)]
Ophrys speculum Link
[uncommon (Gozo), rare (Comino), very rare (Malta)]
0phrys sphegodes Miller subsp. *melitensis* Salkowski
[RDB:48; ENDEMIC; uncommon (Gozo and Malta)]
Orchis morio L.
[RDB:49; probably extinct (Gozo and Malta)]
Orchis italica Poiret
[RDB:49; extinct (Gozo), endangered (Malta)]
Orchis longicornu Poiret.
[records for Gozo and Malta could not be confirmed]

Family: *Poaceae (=Graminae)*

Aeluropus lagopoides (L.) Trinius ex Thwaites
[RDB:42; possibly extinct (Gozo and Malta)]
Cornucopiae cucullatum L.
[RDB:43; probably extinct (Gozo and Malta)]

Family: *Typhaceae*

Typha domingensis L.
[RDB:46; rare (Gozo), uncommon (Malta), on the increase]