

# The flora of Maltese walls

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**Abstract:** The wall flora of Malta contains some 140 species. The participation of plant families and life forms is discussed with regard to the types of walls. The Parietario-Antirrhinetum siculi is documented by plant sociological relevés. *Oxalis pes-caprae* is the most important alien species in the wall vegetation.

## 1. Introduction

The Republic of Malta consisting of the three main islands Malta, Gozo and Comino, and some small rocky islets is situated in the central mediterranean sea about 90 km south of Sicily and 350 km north of Tripoli. These islands are probably the remaining part of the landbridge which existed during the tertiary or part of the pleistocen between Europe and Africa (HASLAM, SELL & WOLSELEY 1977). The islands consist of flat tertiary sedimentary rocks. The whole area of the land side is 316 km<sup>2</sup>, 246 km<sup>2</sup> belong to the main island Malta. The maximum rise of Malta is 251 m.

The climate is typically mediterranean: very hot dry summers and mild winters, where the average temperature of January does not go below + 10°C. The yearly precipitation is said to be about 500 mm, shows however large deviations.

The vascular plant flora of the island groups is with some 900 species astonishingly poor. The reasons could be the very low differences in altitude and sea-level changes in the past. The main reason however is likely to be the high density of population (about 1220 inhabitants per km<sup>2</sup>). Woods or permanent rivers are lacking totally, macchia-like stands are only to be found in small valleys. The part of anthropogenic vegetation as well as of scarce vegetation of the rocky plateaus is relatively high. According to HASLAM, SELL & WOLSELEY (1977) the part of weeds of the flora of Malta is 24 %, the part of ruderals is 16 %. The part of the synanthropic flora in whole is therefore much more higher compared to cities in Germany for example.

Due to these specialities and to the high number of walls the wallflora and vegetation of the main island Malta was studied in 1990 and 1995.

## 2. The wall flora of Malta

Some 144 wall-dwelling species are known for Malta, with further investigations it is possible that the number increases. 144 species means 16 % of the entire flora of Malta, the relation is similar to Central European cities. Amongst these 144 vascular plants growing on walls only 4 ferns are to be found, which seem to be rare. Gymnospermae are missed totally. The family Asteraceae is the most frequent one (24 species), followed by the Poaceae (15 species), Scrophulariaceae (9 species) and Brassicaceae (7 species).

Compared to the atlantic parts of Europe and to the northern part of the Mediterranean region the relatively high amounts of chamaephytes (13,9 %), therophytes (43,1 %), woody plants [phanerophytes + nanophanerophytes + woody chamaephytes] (12,5 %), and geophytes are evident. In contrary the part of hemicryptophytes (22,9 %) is relatively low. The high amount of chamaephytes is characteristic for the whole mediterranean region, whereas a higher amount of woody plants and geophytes is found in the eastern Mediterranean region (Brandes 1992 b).

The following species have been recorded for walls of Malta according to our own findings and completing accounts of HASLAM, SELL & WOLSELEY (1977), the taxonomy follows PIGNATTI (1982):

### 2.1. PTERIDOPHYTA

#### **Adiantaceae**

*Adiantum capillus-veneris*

#### **Aspleniaceae**

*Phyllitis sagittata*, *Phyllitis scolopendrium*

#### **Gymnogrammaceae**

*Anogramma leptophylla*

### 2.2. SPERMATOPHYTA

#### 2.2.1. MAGNOLITAE (= DICOTYLEDONES)

#### **Aizoaceae**

*Mesembryanthemum nodiflorum*

#### **Apiaceae**

*Crithmum maritimum*, *Daucus carota*, *Ferula communis* (fig. 1), *Foeniculum vulgare*, *Smyrniolum olusatrum*

#### **Araliaceae**

*Hedera helix*

### **Asteraceae**

*Aster squamatus*, *Calendula arvensis*, *Calendula suffruticosa*, *Carlina corymbosa*, *Chiliadenus bocconei* (= *Jasonia glutinosa*), *Chrysanthemum coronarium* (fig. 2), *Conyza bonariensis*, *Eupatorium cannabinum*, *Galactites tomentosa*, *Hedypnois cretica*, *Hyoseris radiata*, *Inula crithmoides*, *Inula viscosa* (= *Dittrichia viscosa*), *Pallenis spinosa*, *Phagnalon graecum*, *Phagnalon rupestre*, *Reichardia picroides*, *Scolymus cf. hispanicus*, *Senecio bicolor* (fig. 3), *Senecio leucanthemifolius*, *Senecio vulgaris*, *Sonchus oleraceus*, *Sonchus tenerrimus*, *Urospermum picroides*

### **Boraginaceae**

*Borago officinalis*, *Cerinthe major*, *Echium parviflorum*

### **Brassicaceae**

*Diplotaxis tenuifolia*, *Erophila verna*, *Erysimum cheiri* (= *Cheiranthus cheiri*), *Lobularia maritima*, *Malcolmia africana*, *Matthiola incana* (fig. 4), *Sisymbrium irio*

### **Cactaceae**

*Opuntia ficus-indica*

### **Campanulaceae**

*Campanula erinus*, *Trachelium coeruleum*

### **Capparidaceae**

*Capparis spinosa*

### **Caryophyllaceae**

*Polycarpon tetraphyllum*, *Silene colorata*, *Silene vulgaris*, *Spergularia rubra*

### **Chenopodiaceae**

*Atriplex halimus*, *Atriplex prostrata*, *Beta vulgaris ssp. maritima*, *Chenopodium album*, *Suaeda fruticosa*

### **Convolvulaceae**

*Calystegia sepium*, *Convolvulus althaeoides* (fig. 5), *Convolvulus arvensis*

### **Crassulaceae**

*Aeonium arboreum*, *Sedum rubens*, *Sedum sediforme*, *Umbilicus horizontalis*, *Umbilicus rupestris*

### **Euphorbiaceae**

*Euphorbia peplus*, *Euphorbia cf. pinea*, *Mercurialis annua*

### **Fabaceae**

*Lotus cytisoides*, *Medicago hispida* (= *Medicago polymorpha*), *Psoralea bituminosa*

### **Geraniaceae**

*Erodium cicutarium*, *Erodium malacoides*, *Geranium dissectum*, *Geranium purpureum*

### **Hypericaceae**

*Hypericum triquetrifolium*

### **Lamiaceae**

*Lamium amplexicaule*, *Prasium majus*, *Salvia verbenaca*, *Teucrium fruticans*

**Lauraceae**

*Laurus nobilis*

**Malvaceae**

*Lavatera arborea* (fig. 6), *Lavatera cretica*, *Malva parviflora*, *Malva sylvestris* (fig. 2)

**Moraceae**

*Ficus carica*

**Myrtaceae**

*Eucalyptus spec.*

**Oleaceae**

*Olea europaea*

**Orobanchaceae**

*Orobanche spec.*

**Oxalidaceae**

*Oxalis corniculata*, *Oxalis pes-caprae* (fig. 7)

**Papaveraceae**

*Chelidonium majus*, *Fumaria capreolata*, *Papaver dubium*

**Plantaginaceae**

*Plantago albicans*, *Plantago psyllium*

**Polygonaceae**

*Rumex conglomeratus*

**Rosaceae**

*Rubus ulmifolius*

**Resedaceae**

*Reseda alba* (fig. 8)

**Rubiaceae**

*Galium aparine*, *Galium verrucosum*, *Rubia peregrina*, *Sherardia arvensis*, *Valantia muralis*

**Scrophulariaceae**

*Antirrhinum majus* (fig. 9), *Antirrhinum siculum* (fig. 3, fig. 10), *Cymbalaria muralis*, *Kickxia commutata*, *Linaria pseudolaxiflora*, *Scrophularia peregrina*, *Veronica arvensis*, *Veronica cymbalaria*, *Veronica hederifolia*

**Simaroubaceae**

*Ailanthus altissima*

**Solanaceae**

*Hyoscyamus albus*, *Lycium europaeum*, *Nicotiana glauca*

**Theligonaceae**

*Thelygonum cynocrambe*

### **Urticaceae**

*Parietaria judaica*, *Urtica membranacea*

### **Valerianaceae**

*Centranthus ruber*

## **2.2.2. LILIATAE (= MONOCOTYLEDONES)**

### **Araceae**

*Arisarum vulgare*, *Arum italicum*

### **Liliaceae s. l.**

*Asparagus aphyllus*, *Asphodelus microcarpus* (= *Asphodelus aestivus*), *Smilax aspera*, *Urginea maritima*

### **Poaceae**

*Arundo donax*, *Avena barbata*, *Avena sterilis*, *Brachypodium distachyum* (= *Trachynia distachya*), *Brachypodium ramosum* (= *Brachypodium retusum*), *Bromus diandrus*, *Bromus madritensis*, *Bromus rigidus*, *Catapodium rigidum* (= *Scleropoa rigida*), *Cymbopogon hirtus* (= *Hyparrhenia hirta*), *Cynodon dactylon*, *Hordeum leporinum*, *Lagurus ovatus*, *Oryzopsis miliacea*, *Stipa capensis*

## **3. The flora of different types of walls**

### **3.1. The flora of fortifications**

The walls of most interest are without doubt the ancient bastion walls of Valetta (fig. 11) and Mdina (BRANDES 1992: tab. 8). An inclination of 75-85° is favourable for the colonization by plants. The huge city-walls of the former capital Mdina, situated in the middle of the island, are characterized by the following species:

*Aeonium arboreum*  
*Antirrhinum siculum*  
*Avena barbata*  
*Capparis spinosa*  
*Calendula suffruticosa*  
*Dittrichia viscosa*  
*Ferula communis*  
*Ficus carica*  
*Hedera helix*  
*Hyoseris radiata*

*Lavatera arborea*  
*Lobularia maritima*  
*Matthiola incana*  
*Nicotiana glauca*  
*Opuntia ficus-indica*  
*Oxalis pes-caprae*  
*Parietaria judaica*  
*Prasium majus*  
*Reseda alba*  
*Valantia muralis*

From the synsystematic point of view these vegetation types (see tab. 1) are to be set between *Parietario-Antirrhinetum siculi* Oberd. 1975, *Capparidetum inermis* O. Bolos & R. Molinier 1958 and an undescribed *Matthiola incana-Inula crithmoides*-community, which is characteristic for old fortifications near the sea. In this paper

they are put to the Parietario-Antirrhinetum siculi, which is widespread in Malta at walls and even in quarries. *Capparis spinosa* is in this association only to be found in ancient bastion walls, especially near the sea.

Tab. 1: Vegetation of fortifications in Valetta and Mdina

Number of relevé	1	2	3	4	5	6	7
Exposition	NE	NE	SE	N	S	N	N
Inclination (°)	25	25	10	90	90	85	85
Area (m <sup>2</sup> )	20	30	5	10	30	20	20
Cover (%)	5	15	15	40	20	30	25
Species number	4	9	7	6	4	9	9
<i>Inula crithmoides</i>	1.1	1.1	1.1	.	.	.	.
<i>Matthiola incana</i>	1.1	2.1	1.1	1.1	.	.	.
<i>Senecio bicolor</i>	.	+	.	.	.	.	.
<i>Antirrhinum siculum</i>	.	+	2.1	3.2	1.1	2.1	1.1
<i>Sonchus tenerrimus</i>	.	+	1.1	.	.	2.1	2.1
<i>Capparis spinosa</i>	.	.	.	3.1	2.1	2.1	2.1
<i>Parietaria judaica</i>	.	.	.	2.2	.	2.2	1.2
<i>Reichardia picroides</i>	.	2.1	.	.	.	.	.
<i>Ficus carica</i>	.	.	.	.	.	1.1	.
<i>Hordeum leporinum</i>	.	1.2	2.2	.	.	.	+
<i>Oxalis pes-caprae</i>	+	.	.	.	.	.	+2
<i>Bromus madritensis</i>	.	+°	.	+	.	.	.
<i>Lobularia maritima</i>	.	+2	.	.	.	+2	.
<i>Carlina corymbosa</i>	.	.	.	.	.	+	1.1
<i>Hyoscyamus albus</i>	1.1	.	.	.	.	.	.
<i>Avena barbata</i>	.	.	+	.	.	.	.
<i>Beta vulgaris</i>	.	.	+	.	.	.	.
<i>Urospermum picroides</i>	.	.	.	r	.	.	.
<i>Nicotiana glauca</i>	.	.	.	.	2.1	.	.
<i>Sedum cf. rubens</i>	.	.	.	.	2.2	.	.
<i>Mercurialis annua</i>	.	.	.	.	.	1.2	.
<i>Galactites tomentosa</i>	.	.	.	.	.	+	.
<i>Prasium majus</i>	.	.	.	.	.	.	1.2
<i>Borago officinalis</i>	.	.	.	.	.	.	+

After the attack of the Turkish navy in 1565 the new capital Valetta was fortified very well by the Knights of the Order of St. John of Jerusalem (now known as the Sovereign Military Order of Malta). At the huge bastions the following species indicate the immediate vicinity of the sea:

*Atriplex halimus*  
*Beta vulgaris*  
*Inula crithmoides*

*Senecio bicolor*  
*Suaeda vera*

On the inclined tops of the bastion walls grow among others:

<i>Antirrhinum siculum</i>	<i>Malva parviflora</i>
<i>Avena barbata</i>	<i>Malva sylvestris</i>
<i>Avena sterilis</i>	<i>Matthiola incana</i>
<i>Beta vulgaris</i>	<i>Mercurialis annua</i>
<i>Bromus madritensis</i>	<i>Mesembryanthemum nodiflorum</i>
<i>Campanula erinus</i>	<i>Nicotiana glauca</i>
<i>Capparis spinosa</i>	<i>Orobanche div. spec.</i>
<i>Carlina cf. cymbosa</i>	<i>Parietaria judaica</i>
<i>Convolvulus althaeoides</i>	<i>Phagnalon rupestre</i>
<i>Daucus carota</i>	<i>Plantago afra</i>
<i>Dittrichia viscosa</i>	<i>Polycarpon tetraphyllum</i>
<i>Echium parviflorum</i>	<i>Psoralea bituminosa</i>
<i>Erodium malacoides</i>	<i>Reichardia picroides</i>
<i>Foeniculum vulgare</i>	<i>Reseda alba</i>
<i>Galactites tomentosa</i>	<i>Salvia verbenaca</i>
<i>Hedypnois cretica</i>	<i>Senecio vulgaris</i>
<i>Hordeum leporinum</i>	<i>Silene colrata</i>
<i>Hyoscyamus albus</i>	<i>Sisymbrium irio</i>
<i>Hyoseris radiata</i>	<i>Sonchus oleraceus</i>
<i>Inula crithmoides</i>	<i>Sonchus tenerrimus</i>
<i>Lagurus ovatus</i>	<i>Stipa capensis</i>
<i>Lavatera arborea</i>	<i>Trachynia distachya</i>
<i>Lavatera cretica</i>	<i>Urospermum picroides</i>
<i>Lotus cytisoides</i>	<i>Valantia muralis</i>

The Urtico-Smyrnieta olusatri A. & O. Bolos ex Bolos & Molinier is growing at the wall basis in the shadow of trees. It is replaced by stands of *Lavatera arborea* and *Smyrnieta olusatrum* at non shaded places (BRANDES 1991).

### 3.2. Flora of ruins in cities

As a reminder to the World War II the opera was not reconstructed; the ruins are used as parking place. The opera therefore was chosen as an example for ruined buildings in Valetta. An examination in 1995 showed the following species:

(i) On the top of the walls:

<i>Antirrhinum siculum</i>	<i>Dittrichia viscosa</i>
<i>Aster squamatus</i>	<i>Erodium malacoides</i>
<i>Beta vulgaris</i>	<i>Hordeum leporinum</i>
<i>Bromus diandrus</i>	<i>Lamarckia aurea</i>
<i>Bromus rigidus</i>	<i>Lavatera cretica</i>
<i>Chrysanthemum coronarium</i>	<i>Parietaria judaica</i>
<i>Conyza bonariensis</i>	<i>Polycarpon tetraphyllum</i>
<i>Daucus carota</i>	<i>Reichardia picroides</i>
<i>Diplotaxis tenuifolia</i>	<i>Reseda alba</i>

*Scleropoa rigida*  
*Senecio vulgaris*  
*Sisymbrium irio*

*Sonchus oleraceus*  
*Urospermum picroides*

(ii) at the bottom of the walls:

*Chrysanthemum coronarium*  
*Hordeum leporinum*  
*Lavatera cretica*

*Malva parviflora*  
*Parietaria judaica*  
*Reseda alba*

### 3.3. The wall flora of occupied houses in cities

Naturally the walls of inhabited houses are largely free of plants. In the city of Mdina we found the following plants:

*Reseda alba* (8 houses, especially on ledges and sills)  
*Antirrhinum siculum* (6 houses)  
*Parietaria judaica* (4 houses)  
*Ferula communis* (2 houses, only on ledges and sills)  
*Nicotiana glauca* (2 houses)  
*Diploaxis tenuifolia* (1 house)  
*Dittrichia viscosa* (1 house)  
*Ficus carica* (1 house)  
*Sonchus oleraceus* (1 house)

In the capital Valetta we only got the following results:

*Antirrhinum siculum* (4 houses)  
*Parietaria judaica* (2 houses)

*Hyoscyamus albus* (1 house)  
*Sisymbrium irio* (1 house)

Many species are growing at the bottoms of pavements and walls in the urban settlements, esp. in the suburbs:

*Antirrhinum majus ssp. majus*  
*Antirrhinum siculum*  
*Aster squamatus*  
*Bromus diandrus*  
*Capparis spinosa*  
*Capsella bursa-pastoris*  
*Chenopodium murale*  
*Chrysanthemum coronarium*  
*Conyza bonariensis*  
*Cymbalaria muralis*  
*Daucus carota*  
*Diploaxis tenuifolia*

*Dittrichia viscosa*  
*Erodium malacoides*  
*Euphorbia peplus*  
*Ficus carica*  
*Foeniculum vulgare*  
*Fumaria spec.*  
*Hordeum leporinum*  
*Hyoscyamus albus*  
*Lavatera cretica*  
*Malva parviflora*  
*Malva sylvestris*  
*Oryzopsis miliacea*

*Oxalis corniculata*  
*Oxalis pes-caprae*  
*Parietaria judaica*  
*Polycarpon tetraphyllum*  
*Polypogon monspeliense*  
*Reseda alba*  
*Scrophularia peregrina*

*Silene colorata*  
*Sonchus oleraceus*  
*Spergularia cf. rubra*  
*Sonchus oleraceus*  
*Stellaria media*  
*Thelygonum cynocrambe*  
*Urtica membranacea*

### 3.4. Wall flora of retaining walls around the fields

Species of the class Stellarietea predominate in the flora of the dry walls (fig. 12, fig. 13):

*Arisarum vulgare*  
*Avena barbata*  
*Borago officinalis*  
*Chrysanthemum coronarium*  
*Convolvulus arvensis*  
*Foeniculum vulgare*  
*Fumaria capreolata*

*Hordeum leporinum*  
*Oxalis pes-caprae*  
*Papaver dubium*  
*Reseda alba*  
*Sonchus oleraceus*  
*Sonchus tenerrimus*

*Oxalis pes-caprae* (fig. 7), an alien originating to South Africa is dominant in the dry-stone walls surrounding the fields; in springtime its yellow flowers set the tone of the landscape. Because of its large morphological plasticity, this species is able to produce shoots of some 70 cm, before it develops green leaves (BRANDES 1991). Therefore *Oxalis pes-caprae* is able to use the numerous walls as a place for assimilation, without the problems of dry falling joints. Dry-stone walls surrounding the fields are nowadays the most important growing places of *Oxalis pes-caprae* in Malta.

Low stone walls near the coast are characterized by additional species growing wild in the coastal rocks:

*Beta vulgaris*  
*Capparis spinosa*

*Inula crithmoides*  
*Lobularia maritima*

Retaining walls along the field-paths in the valleys show some weeds and ruderals amongst *Oxalis pes-caprae*:

*Antirrhinum siculum*  
*Arum italicum*  
*Asparagus aphyllus*  
*Aster squamatus*  
*Beta vulgaris*

*Borago officinalis*  
*Convolvulus arvensis*  
*Foeniculum vulgare*  
*Mercurialis annua*  
*Sonchus oleraceus*

Especially on the tops of the walls the following species are growing:

*Arundo donax* (!)  
*Avena sterilis*  
*Hypericum triquetrifolium*

*Reichardia picroides*  
*Silene vulgaris*

In the retaining walls in the wields as well as in the walls of small bridges (fig. 14) are to be found:

*Antirrhinum siculum*  
*Aster squamatus*  
*Atriplex prostrata*  
*Borrago officinalis*  
*Capparis spinosa*  
*Cerintho major*  
*Conyza bonariensis*  
*Diplotaxis tenuifolia*  
*Eucalyptus spec. juv.*

*Ficus carica*  
*Galactites tomentosa*  
*Lavatera cretica*  
*Olea europaea*  
*Oryzopsis miliacea*  
*Oxalis pes-caprae*  
*Parietaria judaica*  
*Rumex conglomeratus*

#### 4. Alien species on the walls

The following alien plants are found on walls:

*Aeonium arboreum*  
*Ailanthus altissima*  
*Arundo donax*  
*Cheiranthus cheri*  
*Cymbalaria muralis*  
*Eucalyptus spec.*

*Nicotiana glauca*  
*Opuntia ficus-indica*  
*Oxalis pes-caprae*  
*Passiflora caerulea*  
*Trachelium caeruleum*

Except of *Oxalis pes-caprae* aliens are of low importance. *Oxalis pes-caprae* is especially dominant in retaining walls and stony dry walls in the open field. Due to its phenotypic plasticity the species is able to occupy niches, which till now are not settled by any species (BRANDES 1991).

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