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UPDATE ON MALTESE FLORA (CENTRAL MEDITERRANEAN) INCLUDING VERY RARE SPECIES OR SPECIES THOUGHT TO BE EXTINCT FROM MAINLAND MALTA OR ITS ISLANDS

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ABSTRACT

The rediscovery of *Lotus halophilus* from mainland Malta (presumed to be found only in the island of Comino) and of *Xanthium spinosum* (presumed extinct) is hereby reported. In addition, a first record of *Myrtus communis* from the island of Gozo and a new population of the very rare *Asplenium trichomanes* are reported. A description of each population and an updated distribution of the three species is given.

Keywords: *Lotus halophilus*, *Myrtus communis*, *Xanthium spinosum*, *Asplenium trichomanes*, Malta

Lotus halophilus Boissier & Spruner (Sand Restharrow)

Ref: Diagn. Pl. Or. Nov. 1(2): 37 (1843)

Lotus halophilus, Boissier & Spruner (syn. = *Lotus pusillus* Viviani non Medicus), is a species found in maritime sands and sand dunes of the Eastern part of the Mediterranean extending west up to Sicily according to Tutin et. al (1978) who state that this species is also found in Crete, Greece, Italy and Sicily (which includes Malta). MedChecklist (2009) updates the distribution list to 19 Central and East Mediterranean stations where the species occurs as a native. These are the East Aegean Islands, Asiatic Turkey, Balearic Islands, Crete, Cyprus, Israel, Jordan, Lebanon, Sinai, Syria, Tunisia, Italy, Malta, Sicily, Greece, Algeria, Morocco, Libya and Egypt. It has a more widespread distribution in the latter North African territories.



Figure1: *L. halophilus* from mainland Malta

Between the last quarter of the 19th century and first quarter of the 20th century, the species has been recorded from several sites in North of Malta, North Comino and North of Gozo as listed in Table 1. These historical records remained unsubstantiated for over 70 years until a survey was carried out by Lanfranco & Stevens (2000) in these cited localities. They found one small population at il-Qala ta' Santa Marija, Comino and therefore rediscovered the record of Borg (1927). Failing to find populations of *Lotus halophilus* in North Malta and Gozo they concluded that the species must have become restricted to Comino and is extinct from mainland Malta and Gozo.

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The author has found 3 populations of *L. halophilus* in the vast area of Marfa peninsula, mainland Malta. The accompanying flora for each meta-population is listed in Table 2. Local distribution is illustrated in Figure 2. The toponyms, date of discovery, population size, habitat and estimated area of occurrence are given below:

- 1) Il-Bir tal-Mellieha, 5 April 2007, 35 specimens on a small degraded sand dune, 1m x 5m
- 2) L/o Rđum tal-Madonna, 3 April 2008, 100-200 specimens on semi-disturbed land rich in sand, 20m x 60m
- 3) L-Ahrax ta' Gewwa, 4 April 2008, 6 specimens at a site 1m x 5m, bordering a sandy field

At the last location, the species' presence was also confirmed by Mr. Timothy Tabone, who was present on site.

Lotus halophilus is considered critically endangered due to its rarity (Lanfranco & Stevens, 2000) and is legally strictly protected by the Flora, Fauna and Natural Habitats Protection Regulations, 2006 (Legal Notice 311 of 2006, Schedule III & VI), as published through the Environment Protection Act and the Development Planning Act. Its rarity is probably due to a local shortage of sandy maritime habitats.

Table 1: Distribution of *Lotus halophilus* on the Maltese Islands.

Recorded Site	Locality	Citation of first record.
Marfa Peninsula [x]	North Mellieha	Sommier & Caruana Gatto (1915)
Mellieha [x]	North East Mellieha	Duthie (1875)
Qbajjar [x]	Marsalforn, Gozo	Borg (1927)
San Blas [x]	Qala, Gozo	Borg (1927)
Ramla Hamra [x]	Nadur, Gozo	Duthie, 1874
Qala ta' Santa Marija [L]	Comino	Borg (1927)
Central parts of Comino [x]	Comino	Sommier & Caruana Gatto (1915)
Il-Bir tal-Mellieha, Marfa	North Mellieha	Stephen Mifsud (new record)
L-Ahrax ta' Gewwa, Marfa	North Mellieha	Stephen Mifsud (new record)
Rđum tal-Madonna, Marfa	North East Mellieha	Stephen Mifsud (new record)

x = Unsubstantiated records for more than 80 years
L = Rediscovered by Lanfranco and Stevens (2000)

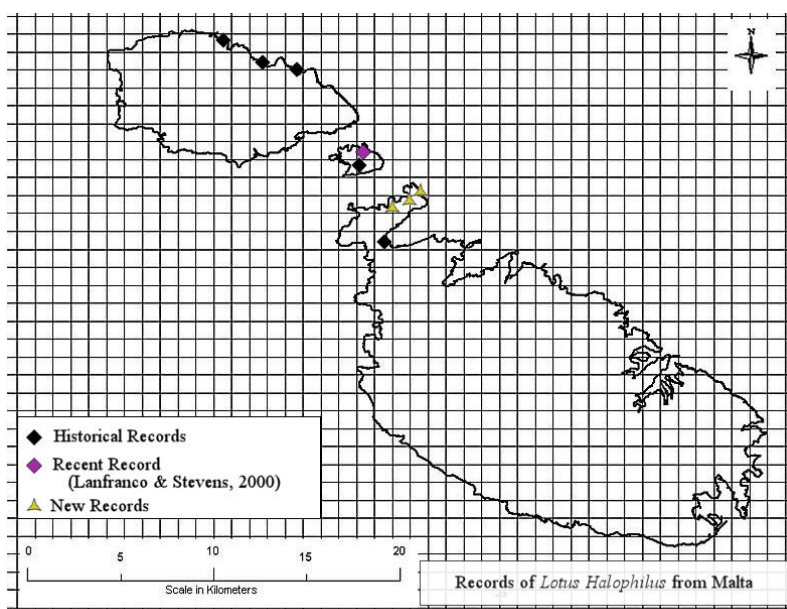


Figure 2: Distribution map of *Lotus halophilus* L. on the Maltese Islands.

Table 2: List of plant species accompanying *Lotus halophilus* at the 3 sites where it was discovered.

Bir tal-Mellieha (Apr 2007)		L-Ahrax ta' Gewwa (Apr 2008)	
<i>Arundo donax</i> L.	F	<i>Astragalus boeticus</i> L.	S
<i>Lotus cytisoides</i> L.	F	<i>Oxalis pes-caprae</i> L.	F
<i>Bromus madritensis</i> L.	F	<i>Hippocrepis multisiliqosa</i> L.	F
<i>Pancreatium maritimum</i> L.	S	<i>Lagurus ovatus</i> L.	F
<i>Silybum marianum</i> (L.) Gaertner	R	<i>Silene colorata</i> Poiret	S
<i>Hippocrepis multisiliqosa</i> L.	S	<i>Rumex buchephalophorus</i> L.	F
<i>Oxalis pes-caprae</i> L.	S	<i>Medicago polymorpha</i> L.	S
<i>Orobanche densiflora</i> Salzmänn f. melitensis Beck	R	<i>Medicago littoralis</i> Loiseleur	R
<i>Polycarpon alsinifolium</i> (Bivona) DC.	R	<i>Sonchus oleraceus</i> L.	S
<i>Scolymus hispanicus</i> L.	R	<i>Mercurialis annua</i> L.	S
<i>Carthamus lanatus</i> L.	F	<i>Bromus rubens</i> L.	S
<i>Cakile maritima</i> Scopoli	R	<i>Orobanche muteli</i> s.l. F.W. Schultz	R
I/o Rđum tal-Madonna (Apr 2008)			
<i>Asparagus aphyllus</i> L.	R	<i>Reichardia picroides</i> (L.) Roth	S
<i>Thymus capitatus</i> (L.) Hoffsgg. & Link	S	<i>Anthyllis vulneraria</i> L. subsp. <i>maura</i> (G.Beck) Maire SHOULD LAST NAMES BE IN ITALICS	S
<i>Lagurus ovatus</i> L.	F	<i>Blackstonia perfoliata</i> (L.) Hudson	R
<i>Hedysarum glomeratum</i> F.G. Dietrich	F	<i>Medicago littoralis</i> Loiseleur	F
<i>Lotus cytisoides</i> L.	S	<i>Brachypodium retusum</i> (Persoon) Beauvois	F
<i>Plantago lagurus</i> L.	S	<i>Lotus edulis</i> L.	S
<i>Erodium laciniatum</i> (Cavanilles) Willdenow	S	<i>Convolvulus lineatus</i> L.	R
<i>Orobanche densiflora</i> Salzmänn f. melitensis Beck	R	<i>Orchis fragrans</i> Pollini	R
<i>Avena</i> spp.	F	<i>Rumex buchephalophorus</i> L.	F
<i>Urginea maritima</i> (L.) Baker	S		

***Myrtus communis* L. (Myrtle)**

Ref: Sp. Pl. 471 (1753).

Myrtus communis L. is an erect, perennial, multi-branched, aromatic shrub that can grow up to 5m high forming white flowers and small berries. It is restricted to the Mediterranean region and South West Europe from where it is reported in many countries (Tutin *et al.*, 1978). The importance of this species in Europe stems from the fact that out of over 60 species belonging to *Myrtus*, only *M. communis* is found in the Mediterranean. (Borg, 1927).

Myrtus communis is a very variable species.. Borg (1927) gives 5 forms of this species, f. *romana*, f. *leiocarpa*, f. *lusitanica*, f. *tarentina* and f. *italica* of which according to him the latter is the one native to Malta. Tutin *et al.*, (1978) only recognises subsp. *romana* and subsp. *tarentina*, while Pignatti (1982) recognises var. *romana*, var. *baetica* and subsp. *tarentina*. and since he found that the forms and dimensions are inconsistent he only gives importance to the latter taxon characterised by its smaller leaves and rounded lobes.

Many authorities such as Sommier & Caruana Gatto (1915) or Borg (1927) think that this small tree was quite frequent on the islands in the past since two water courses were named for it as "Rihan" (the Maltese name for Myrtle): Ghajn Rihana, I/o Burmarrad and Wied Rihan, I/o Nadur, Gozo. This might imply that the plant flourished in these sites even though, it has never been recorded from there. One may be tempted to conclude that this native plant has declined considerably and has therefore been listed in the National Red Data Book by Lanfranco (1989).

The species has been recorded from 12 sites in mainland Malta as shown in table 3 (list of records) and figure 3 (distribution map) but it has been recently found in only nine of these sites (Lanfranco, 1989; Tabone, 2008). Moreover only one specimen was reported from three of these sites (Tabone, 2008; personal observation). No

records (recent or historical) have been gathered from the islands of Gozo and Comino, and so it is assumed that the species has been extirpated from these two islands.

On the 17th January 2009, the author encountered a specimen of *Myrtus communis* in Wied l-Ghawdxija, l/o Munxar Gozo, which constitutes a first record for the island of Gozo. The specimen was growing very close to the rocky sides of the valley in a maquis habitat (Figure 4). The specimen was >2.4m high and 2.7m wide and its lower two-thirds were covered by thick vegetation of *Rubus ulmifolius* Schott., *Smilax aspera* L., and *Asparagus aphyllus* L. (Figure 4). Ground level was very dark and only entangled stems and twigs were present (Figure 4). Therefore, introduction by seed in this spot is deemed very improbable due to adverse conditions for germination. Both the Gozitan population and the native one at San Martin were recorded in valleys having an East/West trending and growing along the southern side of the valley. The area at Wied l-Ghawdxija was surveyed for other specimens of myrtle, to no fruition; however, several parts of the valley could not be accessed due to impenetrable thickets of bramble.

Furthermore, morphometric comparative analysis of the Gozitan population and that of native stock from San Martin, Malta - the first population of *Myrtus communis* reported by Grech (1853) - was carried out. Both shared the same morphological characters, namely acute and triangular calyx lobes (figure 5, left), same size of leaves (2-4cm) with a lanceolate shape and an acute tip sometimes sub-acuminate (figure 5, right), and small berries born on long pedicels, more or less 3 times the length of the berry.

In view of these shared characters, coupled with the ±3m size of the specimen, the location of the specimen in a mainly inaccessible location detached from developed areas and in association with *Rubus* and *Smilax*, the author's belief is that the Gozitan myrtle is a native or archeophytic one, like its San Martin counterpart.

Table 3: Distribution of *Myrtus communis* on the Maltese Islands.

Area/Site	Locality	Citation of first record.
Addolorata	Marsa	Sommier & Caruana Gatto (1915)
Gnien Ingraw [T]	Mellieha	Duthie (1875)
Mtarfa (Santa Lucija area) [T,!]	Mtarfa	Tabone (2008)
Xaghra tal-Isqof [T]	Rabat	Tabone (2008)
Wied Hazrun	Rabat (l/o Dingli)	Borg (1927)
Wied Gerzuma [T]	Rabat (l/o Bahrija)	Sommier & Caruana Gatto (1915)
Il-Ballut tal-Wardija [T,!]	San Pawl il-Bahar	Sommier & Caruana Gatto (1915)
San Martin [T,!]	San Pawl il-Bahar	Grech Delicata (citing Haslam <i>et al.</i> , 1977)
Girgenti [T,!]	Siggiewi	Gauci (citing Haslam <i>et al.</i> , 1977)
Salib tal-Gholja (l/o Siggiewi) [T]	Siggiewi	Tabone (2008)
Wied Hanzira [T]	Siggiewi	Tabone (2008)
Buskett	Siggiewi (l/o Rabat)	Borg (1927)
Wied l-Ghawdxija [!]	Munxar, Gozo	Stephen Mifsud (new record)
! = Observed by author during last 3 years.		
T = Observed by Tabone (2008) during the last 18 years		

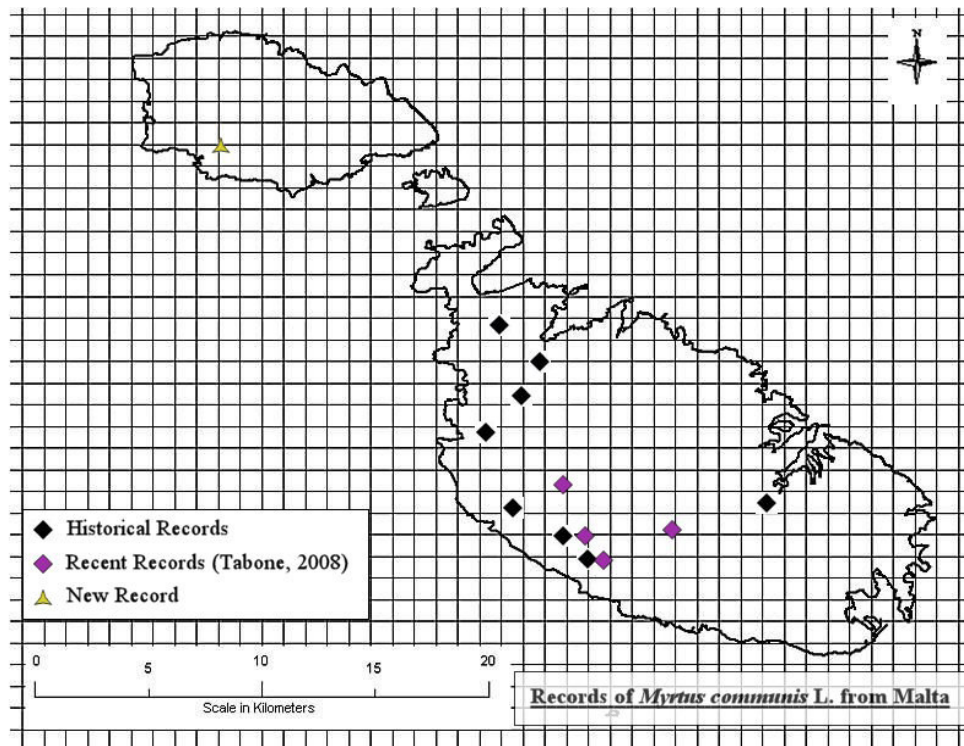


Figure 3: Distribution map of *Myrtus communis* L. on the Maltese Islands.

Table 4: List of plants accompanying *Myrtus communis* L. at Wied l-Ghawdxija, l/o Munxar, Gozo found about 20m radius from the specimen. Recorded in 17th January 2009.

<i>Acanthus mollis</i> L.	F	<i>Rubia peregrina</i> L.	S
<i>Asparagus aphyllus</i> L.	S [^]	<i>Rubus ulmifolius</i> Schott	F [^]
<i>Ceratonia siliqua</i> L.	R	<i>Senecio bicolor</i> (Willdenow) Todaro	S
<i>Cydonia oblongata</i> Miller	R	<i>Smilax aspera</i> L.	F [^]
<i>Geranium purpureum</i> Villars	S	<i>Teucrium fruticans</i> L.	F [^]
<i>Melica minuta</i> L.	S	<i>Thymus capitatus</i> (L.) Hoffsgg. & Link	R
<i>Narcissus tazetta</i> L.	R	<i>Triadenia aegyptica</i> (L.) Boiss.	F
<i>Parietaria judaica</i> L.	F		

Key: **F** = Frequent, **S** = Scarse, **R** = Individual or up to 5 plants,
[^] = Surrounding the specimen of *Myrtus communis* hence implying a negative effect.



Figure 4: Habitat of *Myrtus communis* found at Wied I-Ghawdxija, Gozo. Left: location of the population at the edge of the valley sides (indicated by yellow arrows); Centre: population in situ competing with *Rubus ulmifolius*, *Smilax aspera* and *Asparagus aphyllus*; Right: image (taken with flash-light) of ground level of population which was completely covered with vegetation, stems and entangled twigs and hence very dark.

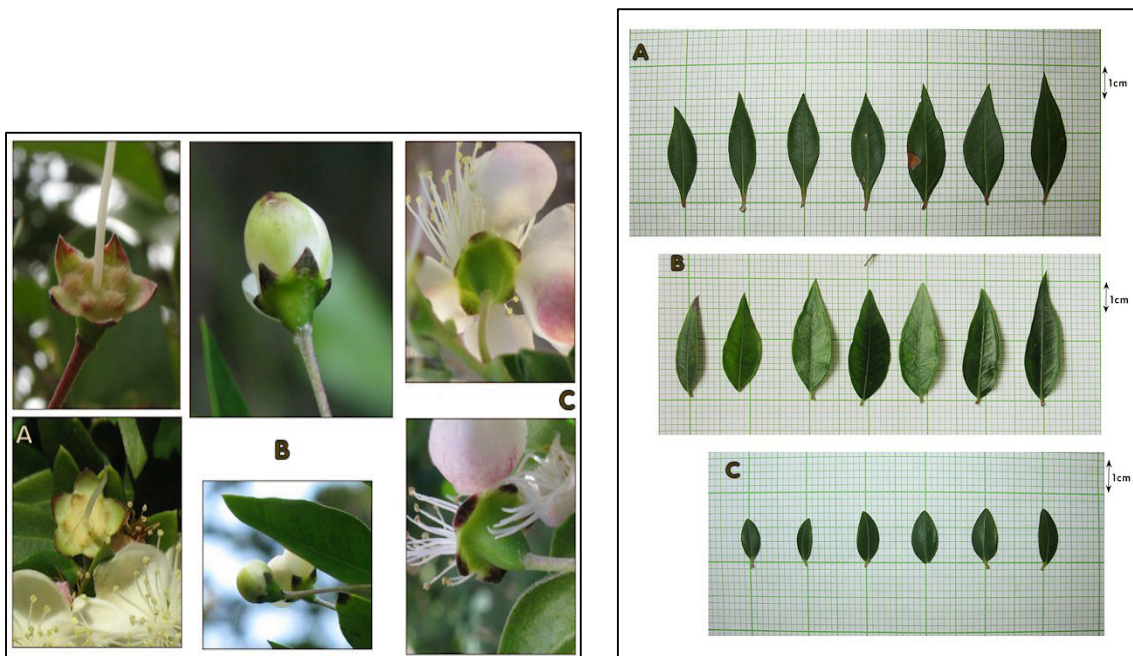


Figure 5: Comparison of calyx lobes and mature leaves from a specimen of native myrtle stock in San Martin (A), from the specimen of myrtle found at Wied I-Ghawdxija (B) and from a cultivated specimen present in a park at Santa Venera (C), probably being *M. communis* subsp. *tarentina* from Pignatti (1982) descriptions.

***Xanthium spinosum* L. (Spiny Cocklebur, Spiny Burweed)**

Ref: Sp. Pl. 987 (1753).

In *Flora Europaea*, Tutin *et al.*, (1976) describes *Xanthium spinosum* (syn. = *Acanthoxanthium spinosum* (L.) Fourr.) as an annual plant native of South America which has been introduced and become naturalised in South and Central Europe and which is a casual introduction further North. The native range is specified as Chile by WSNWCB (2009). Globally, it occurs between latitudes 43 degrees S and 50 degrees N and is widely

distributed in the Mediterranean region and Europe, throughout most of Australia, in some coastal African countries, and in southern parts of South America and the United States and seldom found in the tropics. (Holm *et al.*, 1977).

Each mature plant produces numerous fruit known as burs with 2 seeds each. Seeds have a very successful dispersion mechanism via their specialised fruit structure. Each fruit bears numerous long bristles with robust hooks at the tips which easily adhere to wool, fur, clothing, hay bales and mud. Additionally, the fruits float and thus they readily get dispersed by running water (Smith, 2002). Seeds can remain viable for up to 8 years, resulting in staggered germination over a period of several years during favorable growing conditions. (Redosevich and Holt, 1984).

The plant grows in different habitats but it is mainly described as a pasture or meadow weed. It is easily found growing in disturbed areas and abandoned fields and is sometimes common around waterholes and along floodplains, canals, ditches, creek flats, river terraces, and other moist places (Holm *et al.*, 1977).

The first records of this species were by Gulia (1858) who reported that the plant had colonised the aqueduct of Marsa. Some years later he (Gulia, 1874) wrote that the populations had diminished considerably since the area was being used for military training and was getting drier. Borg (1927) writes that *Xanthium spinosum* is not common. Besides confirming the population of Gulia in Marsa, he adds the localities of Addolorata Cemetery in mainland Malta and Marsalforn and Mgarr in Gozo. Haslam *et al.* (1977) seem to cite the same localities from old literature and fail to give other new stations. The species is not included in the red data book (Lanfranco, 1989) because it is of alien origin, though the author thought it extinct from our islands since it had never been seen or reported in the previous decade (pers. comm. Lanfranco, Sep 2009).

Xanthium strumarium L. is also present on the Maltese islands and it usually exhibits itself as large populations in valley beds. It was observed by the author in Wied tal-Hzejjen (l/o Burmarrad), Ghajn Rihana (l/o Burmarrad), Wied il-Ghasel (l/o Mosta) and in Wied tal-Qlejgha (l/o Rabat). It can be easily distinguished from *X. spinosum* by having larger and wider leaves without any spines at their base. The fruit has 2 conspicuous horns at the top.

The author has encountered a single specimen of *Xanthium spinosum* in the valley system of Mgarr ix-Xini, l/o Xewkija, Gozo on the 29th of June 2009. Accompanying flora is given in Table 5 below. It was growing in a small clearing in the valley bed on rather damp (but not wet) ground with many stones and gravel. The plant could have been reintroduced recently because only one specimen was found, even after an exhaustive inspection about 50m radius away from the specimen's locus.

Table 5: List of plants accompanying *Xanthium spinosum* L. at Mgarr ix-Xini Valley, l/o Xewkija, Gozo found about 20m radius from the specimen (recorded on June 2009).

<i>Acanthus mollis</i> L.	S	<i>Heliotropium europaeum</i> L.	S
<i>Amaranthus blitoides</i> S. Watson	F	<i>Lepidium graminifolium</i> L.	S
<i>Anagallis arvensis</i> L.	F	<i>Parietaria judaica</i> L.	S
<i>Ballota nigra</i> L. subsp. <i>uncinata</i> (Fiori & Bèguinot) Patzak	R	<i>Picris echioides</i> (L.) Holub	S
<i>Chenopodium opulifolium</i> Schrader	R	<i>Rubus ulmifolius</i> Schott	F
<i>Cynoglossum creticum</i> Miller	S	<i>Solanum nigrum</i> L.	R
<i>Dittrichia viscosa</i> (L.) Greuter	R	<i>Sonchus oleraceus</i> L.	R
<i>Ficus carica</i> L.	S	<i>Teucrium fruticans</i> L.	R
Key: F=Frequent, S= Scarce, R=Individual or up to 5 plants			

This new record poses a problem as to the origin of the specimen in this valley, given that it was never reported from here. The most plausible explanation is through agriculture practice such as through contaminated feed or through contaminated crop seed, given that most of the valley sides are bordered by numerous worked fields and at least two large cattle farms are stationed at this valley. Holm *et al.* (1977) specifically writes that seeds are dispersed from impure seed stocks and weedy hay while (Holm *et al.*, 1977; Smith, 2002) states that a common introduction and dispersal mechanism is from imported livestock.

X. spinosum is one of the world's worst weeds according to Holm *et al.* (1977) and is declared as a noxious weed by USDA (2009) in Arkansas and Washington. This property arises from a number of reasons namely due to prolific seed production and high germination and survival rates. The presence of two seed types in each bur also increases its survival chances (Holm *et al.*, 1977). Additionally the plant is not normally eaten by herbivores since it is toxic and is avoided by grazers (Foster *et al.*, 1990).



Figure 6: *Xanthium spinosum*, Mgarr ix-Xini, Xewkija, Gozo

***Asplenium trichomanes* L. (Maidenwort Spleenwort)**

The fern *Asplenium trichomanes* L. (syn. = *Chamaefilix trichomanes* (L.) Farw.) was recorded from 4 sites in Malta in the distant past as follows: Wied Babu (Gulia, 1872), Mgarr ix-Xini (Duthie, 1875), Ghajn Rihana (Sommier & Caruana Gatto, 1915) and Gebel Sornu close to Ghajn Rihana (Borg, 1927). There were no records of this species from any of the sites mentioned above for many decades and it was presumed as locally extirpated Lanfranco (1989). In October 2005, Tabone (2007) rediscovered a new population of *Asplenium trichomanes* at Fuq tal-Gruwa in Ta' Cenc, Gozo and it consisted of 15 specimens. Vesselinov Lalov *et al.* (2008), also found a population of 3 specimens in Mistra Rocks, l/o Nadur, Gozo, (observed by the author a year later) and for this reason they considered it as very rare for Malta.

The author found a population at the valley sides of Wied Ta' Mgarr ix-Xini, (l/o Xewkija) Gozo. The population consisted of 25 specimens of *Asplenium trichomanes* accompanied by *Anogramma leptophylla* (L.) Link, *Adiantum capellus-veneris* L., *Parietaria lusitanica* L. and mats of mosses on the surface of the rock. This population is so far the largest population of *Asplenium trichomanes* rediscovered recently. It is not certain if the old record at Mgarr ix-Xini by Duthie (1875) corresponds to the same locality found by the author, since this valley is more than 2km long. *Asplenium trichomanes* is legally protected through the Flora, Fauna and Natural Habitats Protection Regulations, 2006 (Legal Notice 311 of 2006, Schedule VI), as published through the Environment Protection Act and the Development Planning Act.

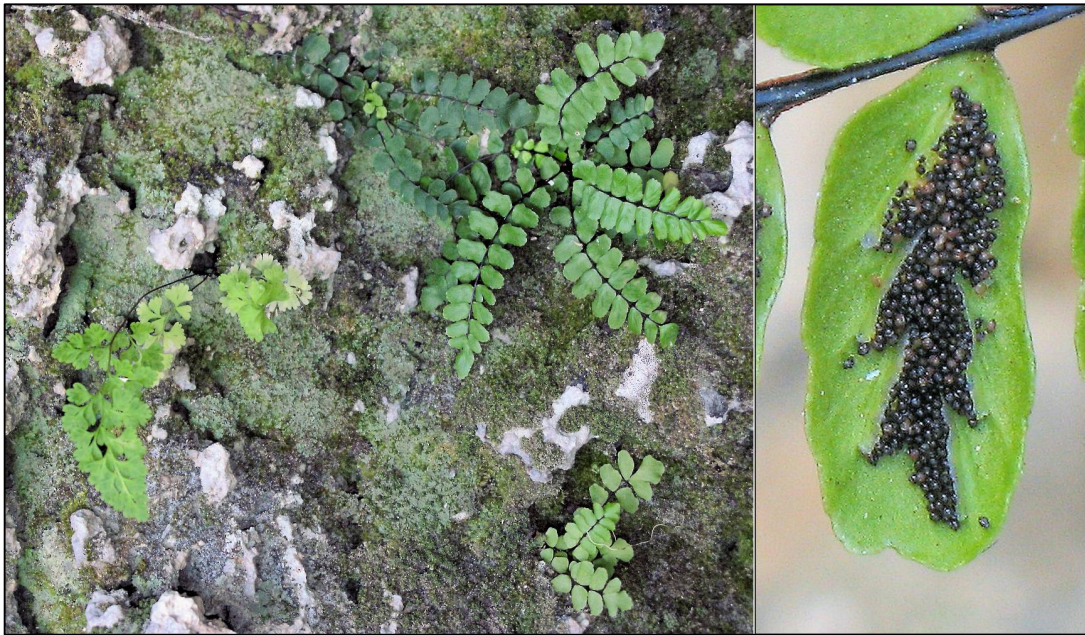


Figure 7: Left: *Anogramma leptophylla* (L.) Link [left] and *Asplenium trichomanes* L. [right] growing together at Wied ta' Mgarr ix-Xini, Gozo. Right: Close-up of the sori of *A. trichomanes*.

All photographs in this article were taken by the author himself.

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