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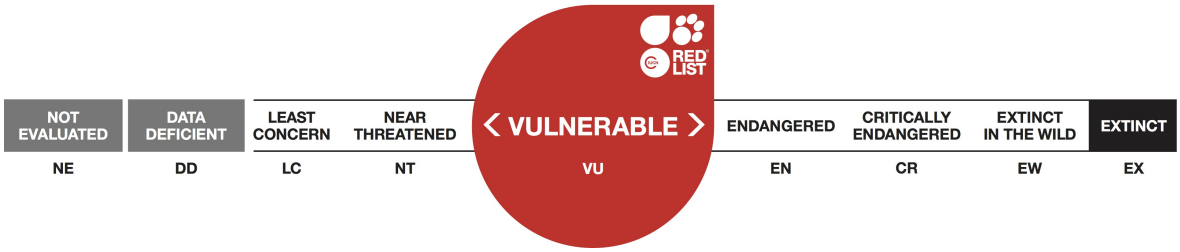
Linaria pseudolaxiflora, Maltese Toadflax

Assessment by: Mifsud, S., Domina, G., Gargano, D. & Montagnani, C.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Plantae	Tracheophyta	Magnoliopsida	Scrophulariales	Scrophulariaceae

Taxon Name: *Linaria pseudolaxiflora* Lojac.

Common Name(s):

- English: Maltese Toadflax

Taxonomic Source(s):

Board of Trustees, RBG Kew. 2019. Plants of the World Online Portal. Richmond, UK Available at: http://www.plantsoftheworldonline.org.

Taxonomic Notes:

Identification Information:

*Linaria pseudolaxiflora w*as first described from volcanic escarpments of Monte Vulcano in Linosa (Lojaconoi, 1885, Sommier, 1910). It was recorded in Gozo and Comino in the Maltese Islands by Sommier (1910) with more localities being recorded later by Sommier & Caruana Gatto (1915) and Borg (1927). It was regarded as a rare species and included in the Red List of the Maltese Islands as a threatened species with a restricted distribution in the Maltese Islands and the Mediterranean region (Lanfranco, 1989). However, in the last 20 years, it was discovered in various localities and stations by Tabone (2007, 2008), Mifsud (2013) and Mifsud et al. (2015) from mainland Malta, Gozo, Selmunett and Comino. Unlike Linosa, where this species grows on igneous rock, in Malta it is found on karst limestone mostly at exposed margins of escarpments, hill tops and coastal cliffs. It is more frequent and widespread in Gozo than in mainland Malta. Nevertheless the populations of Linosa and the Maltese Isalnds show now significant morphological differences despite the different habitat the occur.

Linaria pseudolaxiflora is morphologically related but differs from *L. laxiflora* Desf. by being smaller and having more gracile stems, less succulent leaves, slightly more colourful flowers (Lojaconoi, 1885). *L. flava* (Poir.) Desf. resembles *L. pseudolaxiflora* in habit but the flowers are distinctly yolk-yellow and is distributed in western parts of north Africa and south Europe, absent in mainland Italy or Sicily.

Assessment Information

Red List Category & Criteria: Vulnerable C2a(i) ver 3.1

Year Published: 2019

Date Assessed: September 23, 2019

Justification:

Linaria pseudolaxiflora is an annual plant species that is endemic to the islands of Linosa (Italy) and the Maltese Archipelago. It has a scattered distribution, with most populations being severely fragmented. However, more small populations or pockets of plants have been reported during recent years (Tabone

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2007, 2008; Mifsud 2013; Mifsud *et al.* 2015) and at present, its frequency should be assigned as scarce to locally frequent rather than rare as it was considered 30 years ago (Lanfranco 1989). It is found on five different Islands (Malta, Gozo, Comino, Selmunett and Linosa) covering an Area of Occupancy (AOO) of 64 km^2.

The species is subject to anthropogenic and natural pressures, the most important being land reclamation for agriculture or bird trapping sites and natural cliff collapsing and landslides. A small population occurring on the cliff plateaux in Gozo recorded in the 1990s (Tabone 2007) has disappeared after recent surveys carried out in March 2019. The single population on Linosa seems to be stable. The population is quite widespread, although some decline of its range has been observed or predicted. However, the overall population size is small (<4,000 individuals, with all assumed to be mature). The largest subpopulation found during fieldwork in 2019 (S. Mifsud pers. comm. 2019) consisted of 300-400 estimated individuals at Ghasri on Gozo in Malta, with a total count across the Maltese islands of 1,898 individuals estimated. Only 130 individuals were found during a survey in 2019 on Linosa. As a result, the species is assessed as Vulnerable (VU C2a(i)) as a result of the restricted subpopulation size and a continuing decline on Malta in the number of mature individuals.

Previously Published Red List Assessments

2011 – Vulnerable (VU)
http://dx.doi.org/10.2305/IUCN.UK.2011-1.RLTS.T161903A5511390.en

Geographic Range

Range Description:

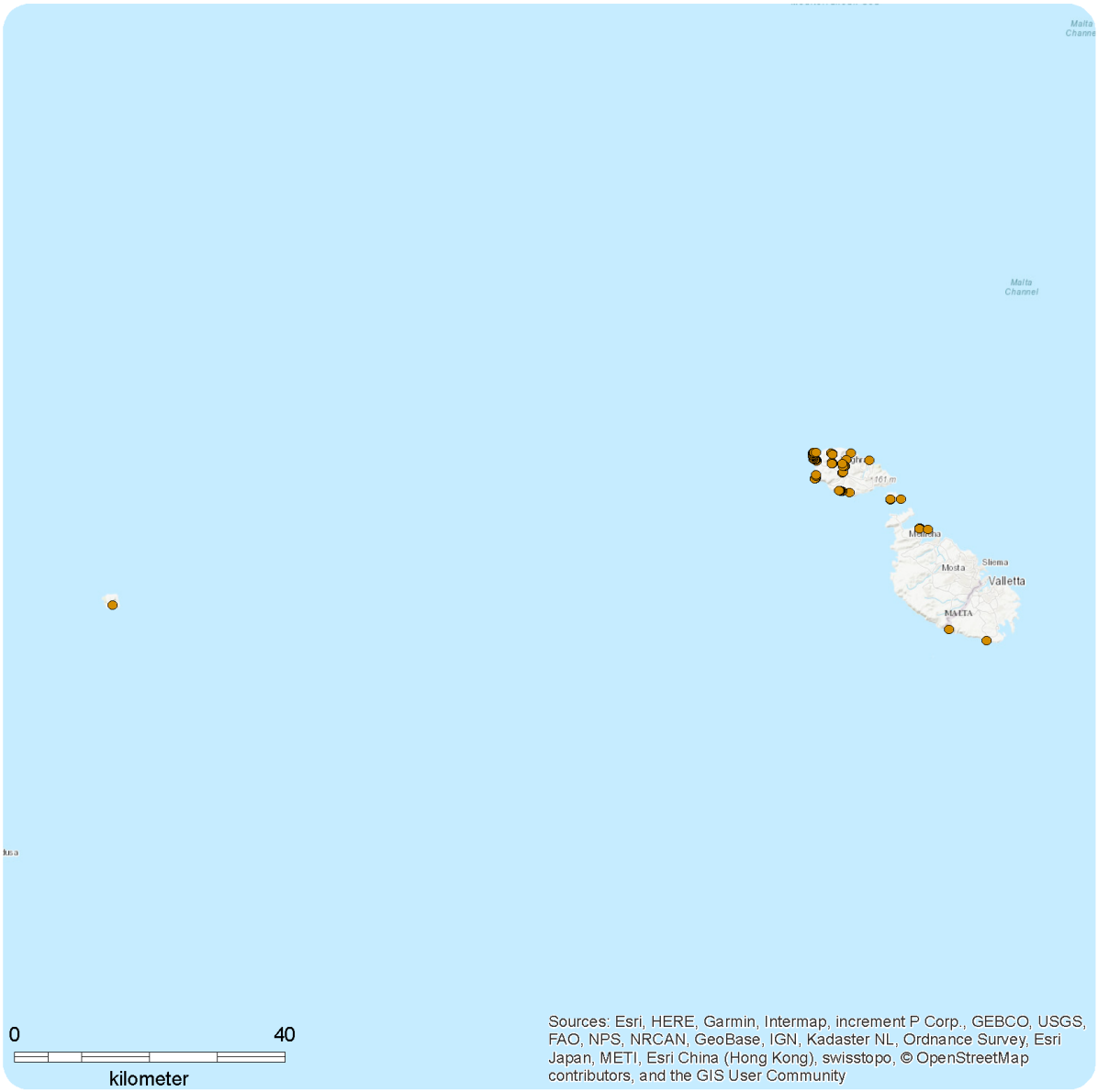
This annual plant is endemic to Linosa (the type locality), a small volcanic island about 210 km southwest from Sicily (Italy), and to the Maltese Archipelago, where it is recorded from mainland Malta and the islands of Gozo, Comino and Selmunett (Sommier 1910, Sommier and Caruana Gatto 1915, Lanfranco 1989; Tabone 2007, 2008; Mifsud 2013, Mifsud *et al.* 2015). It was recently rediscovered on the small islet of Selmunett (Mifsud *et al.* 2015) after not being confirmed for a few decades. There is only one known locality on Linosa, whereas the latest surveys on the Maltese Islands (Mifsud 2013) found that the species is frequent but fragmented, occurring mostly along the coastal cliffs and cliff-tops margins. In Malta, the AOO is about 270 km^2, whilst on Linosa, the species is known from one locality, on Monte Vulcano, distributed across an area of about 3,500 m^2 (0.0035 km^2). The overall AOO is 64 km^2 and the EOO is less than 2,300 km^2.

Country Occurrence:

Native: Italy (Sicilia); Malta

Distribution Map

Linaria pseudolaxiflora



Range

- Extant (resident)

Compiled by:

IUCN

The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

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Population

On Linosa, surveys carried out in the spring of 2019 (E. Di Gristina and G. Domina pers. comm. 2019) resulted in a count of 130 individual plants. There are no previous counts to draw observations about population trend on Linosa.

This species was considered to be 'rare' (Lanfranco 1989, Tabone 2008; Commission of the European Communities 2009, 2013), but recent surveys (Mifsud 2013) found the species to be generally scarce but sometimes locally frequent, such as at the western and southern coast of Gozo. Based on plant counts gathered in spring 2019 from 98 meta-populations in 17 main localities, the entire population is estimated to comprise about 2,000 plants but the population size of therophytes fluctuates from year to year depending precipitation and climatic conditions, and this figure is still an estimate. Nevertheless, it is very unlikely that the population size is more than 4,000 mature individuals. The largest subpopulation found during fieldwork in 2019 (S. Mifsud pers. comm. 2019) consisted of 300-400 estimated individuals at Ghasri on Gozo, with a total count across the Maltese islands of 1,898 individuals estimated.

Current Population Trend: Decreasing

Habitat and Ecology **(see Appendix for additional information)**

In Malta, the species is an annual plant that lives on rocky soils preferring a sup-rupestral habitat. It is frequently found on the margins of hill-tops, coastal cliffs and escarpments where the rocky ground is exposed and not vegetated by large plants. A few populations are found in maritime garigue or in limestone slabs in flagstones of fortifications (Citadella, Gozo). The Maltese toadflax mostly grows in shallow, somewhat arid, calcareous soils (Lajocanoi 1885, Sommier and Caruana Gatto 1915, Mifsud 2013; Commission of the European Communities 2009, 2013). On Linosa, it grows on volcanic rocky soil (G. Domona pers. comm. 2019), forming somewhat more densely branched plants but retaining same significant morphological characters.

Systems: Terrestrial

Use and Trade

The species is not documented or known to be utilised.

Threats **(see Appendix for additional information)**

On Malta, the species is threatened by the erosion of cliff or hill-top margins from natural causes, resulting in significant habitat loss. The plant can't compete with higher vegetation and it is mostly found in very exposed and arid areas with shallow soil. Expansion inland from these margins is not feasible for this species, especially on many cliff tops on Gozo.

Human disturbances include trampling when the plants grow on or close to footpaths along the cliff edges, the introduction of alien species (e.g. *Agave americana* at ta' Cenc in Malta and *Oxalis pes-caprae* on Linosa; this alien invasive plant is the only current threat to the species on that island). On Malta, illegal land reclamation for creating and improving fields, and the construction of bird trapping sites are ongoing threats. Indeed, a considerable part of the population in Malta is assumed to have

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been lost in the remote past by the formation of fields extending out to the very edge of cliff tops in coastal areas. The population at Gelmus may be assumed to have been lost by firework activities and dumping of waste, the latter observed at a few other sites too.

Conservation Actions (see Appendix for additional information)

The species is listed on Annex II of the Habitats Directive and under Appendix I of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). The species was assessed globally in 2011 as Vulnerable (VU D2) (Gargano and Montagnani 2011).

In the Italian Red Data Book, the species is listed as Lower Risk and the subpopulation found on Linosa falls within a Natura 2000 protected area (SIC ITA040001). In Malta, a large proportion of the entire population falls within a number of protected Natura 2000 sites. Moreover, the species is strictly protected by Legal Notice 311/2006 of the Maltese Islands and considered a species of national interest with need of strict national protection. It can be protected in two fundamental ways through specific protection of the living individuals by enforcing environmental laws to the species and protected areas and through extension or reinforcement of the current populations by *in situ* propagation or human-mediated seed dispersion from current population to suitable unpopulated areas closeby. The competent authorities in Malta should enforce more the law when populations are reported to be negatively affected by anthropogenic disturbance namely by land reclamation.

Credits

Assessor(s): Mifsud, S., Domina, G., Gargano, D. & Montagnani, C.

Reviewer(s): Allen, D.J.

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External Resources

For Images and External Links to Additional Information, please see the Red List website.

Appendix

Habitats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Habitat	Season	Suitability	Major Importance?
3. Shrubland -> 3.4. Shrubland - Temperate	Resident	Marginal	-
3. Shrubland -> 3.8. Shrubland - Mediterranean-type Shrubby Vegetation	Resident	Marginal	-
4. Grassland -> 4.4. Grassland - Temperate	Resident	Marginal	-
0. Root -> 6. Rocky areas (eg. inland cliffs, mountain peaks)	Resident	Suitable	Yes
13. Marine Coastal/Supratidal -> 13.1. Marine Coastal/Supratidal - Sea Cliffs and Rocky Offshore Islands	Resident	Suitable	Yes
14. Artificial/Terrestrial -> 14.5. Artificial/Terrestrial - Urban Areas	Resident	Marginal	-

Plant Growth Forms

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Plant Growth Forms
Annual
Forb or Herb

Threats

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Threat	Timing	Scope	Severity	Impact Score
10. Geological events -> 10.3. Avalanches/landslides	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality		
1. Residential & commercial development -> 1.3. Tourism & recreation areas	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.2. Unintentional effects (species is not the target)	Ongoing	Minority (50%)	Slow, significant declines	Low impact: 5
	Stresses:	2. Species Stresses -> 2.3. Indirect species effects -> 2.3.2. Competition		
6. Human intrusions & disturbance -> 6.1. Recreational activities	Ongoing	Minority (50%)	Slow, significant declines	Low impact: 5

	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.2. Species disturbance		
8. Invasive and other problematic species, genes & diseases -> 8.1. Invasive non-native/alien species/diseases -> 8.1.2. Named species (Oxalis pes-caprae)	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
	Stresses:	2. Species Stresses -> 2.3. Indirect species effects -> 2.3.2. Competition		
8. Invasive and other problematic species, genes & diseases -> 8.1. Invasive non-native/alien species/diseases -> 8.1.2. Named species (Agave americana)	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
	Stresses:	2. Species Stresses -> 2.3. Indirect species effects -> 2.3.2. Competition		
9. Pollution -> 9.4. Garbage & solid waste	Unknown	Unknown	Negligible declines	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		

Conservation Actions in Place

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Actions in Place
In-Place Land/Water Protection and Management
Occur in at least one PA: Yes
In-Place Education
Included in international legislation: Yes

Conservation Actions Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Conservation Actions Needed
4. Education & awareness -> 4.3. Awareness & communications
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.2. National level

Research Needed

(http://www.iucnredlist.org/technical-documents/classification-schemes)

Research Needed
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km²): 64
Continuing decline in area of occupancy (AOO): Yes
Extreme fluctuations in area of occupancy (AOO): No
Estimated extent of occurrence (EOO) (km²): 2300
Continuing decline in extent of occurrence (EOO): Yes
Extreme fluctuations in extent of occurrence (EOO): No
Number of Locations: 19
Continuing decline in number of locations: Yes
Extreme fluctuations in the number of locations: No
Lower elevation limit (m): 21
Upper elevation limit (m): 182
Population
Number of mature individuals: 2000-4000
Continuing decline of mature individuals: Yes
Extreme fluctuations: No
Population severely fragmented: No
No. of subpopulations: 18
Continuing decline in subpopulations: Unknown
Extreme fluctuations in subpopulations: Unknown
All individuals in one subpopulation: No
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes

The IUCN Red List Partnership

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The IUCN Red List Partners are: Arizona State University; BirdLife International; Botanic Gardens Conservation International; Conservation International; NatureServe; Royal Botanic Gardens, Kew; Sapienza University of Rome; Texas A&M University; and Zoological Society of London.