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Conservation status of the endemic vascular flora of Sicily

Abstract

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The results of a comparative study of the quantitative data of the IUCN risk categories attributed to the endemic taxa of the Sicilian vascular flora are reported. 430 Sicilian strictly endemic taxa has been evaluated by comparing the data of the risk categories attributed by published sources. 400 taxa have received at least one assessment of their conservation status, 30 taxa have not yet been considered. 278 received an assessment of their conservation status in accordance with the IUCN criteria, while the remaining 152 have not yet been evaluated according to these criteria.

Key words: assessment, IUCN criteria, Mediterranean flora, native flora, red list, risk categories.

Introduction

How it is well known, among the large islands of the Mediterranean basin, Sicily is the one with the richest and most diversified plant heritage. Over 3.250 specific and infraspecific taxa of native, naturalized or traditionally grown exotic plants are reported for this island (Giardina & al. 2007; Raimondo & al. 2010; Bartolucci & al. 2018a; Galasso & al. 2018). In this contingent, the most represented families are *Asteraceae*, *Poaceae*, *Fabaceae*, *Brassicaceae*, *Apiaceae*, *Caryophyllaceae*, *Lamiaceae*, *Rosaceae*, etc. According to Bartolucci & al. (2018a), the native flora of Sicily is made up of 2.736 specific and subspecific taxa.

The endemic contingent of the island accounts for just over 15% and the most represented families are: *Asteraceae*, *Fabaceae*, *Plumbaginaceae*, *Brassicaceae*, *Poaceae*, *Caryophyllaceae*, etc. The Sicilian endemic contingent includes taxa often with a punctual distribution. The number of endemics at risk of extinction has increased year by year. Several taxa, attributed to lower risk categories, even if they fall within protected areas, do not enjoy any particular protection, others have seen reduced or altered their elective habitat, suffering a strong demographic contraction. It is the case, for instance, of *Adenostyles alpina* subsp. *nebrodensis* (Wagenitz & I. Müll.) Greuter, an endemic of the Madonie Regional Park (NC-Sicily). In the past, probably, its single population was well represent-

ed, as suggested by the consistent number of historical specimens stored in the *Herbarium Mediterraneum Panormitanum* (PAL). At present, however, the taxon survives with only one single individual. The strong contraction of its population was caused probably by the alteration of its habitat. In fact, during the twentieth century, before the establishment of the Madonie Regional Park, the watercourse along which the population grew, was interrupted and channeled causing the loss of the necessary humidity for the growth of the plants. Therefore, this taxon is currently at risk of extinction. Another case that deserves mention is that of *Ptilostemon greuteri* Raimondo & Domina. It is a shrub known only from the northern slopes of Monte Inici (Castellammare del Golfo, TP, NW-Sicily). The entire population, located in two different slopes (Cappellone Valley and the valley between Pizzo Branco and Cozzo Monaco) of Monte Inici, is represented of a few thousand individuals. The repeated and close wildfires represent the main threat for the conservation of its population. Although the species is capable of rapid renewal after fires, in the long run, repeated and nearby fires are causing its population reduction. In fact, *P. greuteri* was classified as Endangered (EN) at the time of the species description (Raimondo & Domina 2006), currently, due to a better knowledge of the size of the population and the threats, it is listed as Critically Endangered (CR).

There are several contributions, including expert-based evaluations, on the endangered flora of Sicily. The first censuses and evaluations (Raimondo & al. 1992; Raimondo & al. 2011) were drawn up on an expert-based approach rather than detailed methodical evaluations. Instead, the following ones Red list (Rossi & al. 2013, 2020; Orsenigo & al. 2018) made within the Italian Botanical Society on behalf of the Ministry of the Environment of the national government, follow the scientific criteria proposed by the IUCN (2019). Since not all endemic Sicilian taxa at risk of extinction have received an assessment of their conservation status, in this paper we report the comparison of the quantitative data of the IUCN risk categories attributed to the endemic taxa of the Sicilian vascular flora.

Material and Methods

Comparison of the quantitative data of the IUCN risk categories attributed to the endemic taxa of the Sicilian vascular flora was done integrating the data taken from the previous published sources (Raimondo & al. 1992, 2011; Rossi & al. 2013, 2020; Brullo & Brullo 2020, Brullo et al. 2011). Since different taxa have a different taxonomic delimitation in the different contributions, in this paper we follow the taxonomic and nomenclatural data from Bartolucci & al. (2018a, 2018b, 2018c, 2019a, 2019b, 2020) and Galasso & al. (2018a, 2018b, 2018c, 2019a, 2019b, 2020a, 2020b, 2021). For *Brassica* was followed Malfa & al. (2020) and for *Aria* and *Sorbus* Raimondo & al. (2019).

The 430 Sicilian strictly endemic taxa have been evaluated by comparing the data of the IUCN risk categories attributed by the mentioned published sources (Raimondo & al. 1992, 2011; Rossi & al. 2013, 2020; Brullo & Brullo 2020) and are listed in the Electronic Supplementary File (ESF 1).

Results

From the analysis of the data, it emerges that 400 taxa (93%) have received the assessment of their conservation status; only 30 taxa (7%) have not yet been considered (Fig. 1a).

Because only the two Red Lists drawn up by the Italian Botanical Society follow the IUCN criteria, we have also calculated the number of taxa whose conservation status has been assessed in accordance with these criteria. It was found that 278 (65%) Sicilian endemic taxa received the evaluation of their conservation status in accordance with the IUCN criteria, while the risk category of a considerable part of the Sicilian endemic taxa, 152 (35%), is not still been evaluated (Fig. 1b).

In addition, we also investigated whether the conservation status of the taxa has improved or worsened. A substantial number of taxa (29.5%) have improved its conservation status. For example, the conservation status of taxa belonging to the genus *Limonium* and *Ophrys* has significantly improved. In the case of the *Limonium* taxa, the lower current risk assessment can be explained on the basis that while in the past the risk was overestimated when the distribution of the species was narrow, now if the habitat of the species is conserved and there are no threats, the risk is considered lower. In the case of the *Ophrys* taxa, the lower risk can be interpreted with the increase of the knowledge on their distribution. In fact, the ever increasing number of lovers for these species has made it possible to discover new populations and this has allowed the improvement of their conservation status. *Calendula suffruticosa* subsp. *maritima* (Guss.) Meikle (Fig. 2) has been assigned to a lower risk category both as a result of studies aimed at the knowledge of its punctual distribution (Grammatico 2011) which have increased its Area of Occupancy but also because it has proved to be a plant that takes advantage of anthropogenic disturbance.

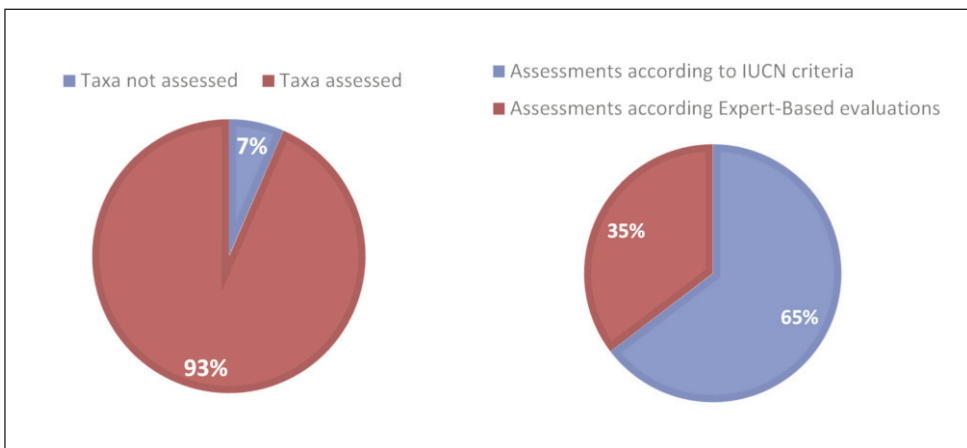


Fig.1. **a.** Percentage of Sicilian endemic taxa with an assessment of their conservation status and taxa without any assessment; **b.** Assessments of the Sicilian endemic taxa done according to the IUCN criteria and assessment done on Expert-Based evaluations.



Fig. 2. *Calendula suffruticosa* subsp. *maritima* along the coast of Trapani (NW Sicily) growing on construction waste.

On the contrary, only a small number of taxa (3.9%) have, instead, shown a worsening of their risk categories and this is to be related to the deterioration of their growth habitat, this is true above all for wetlands and coastal habitats (Domina & al. 2018, 2020; Sciandrello 2020). For example, in the case of *Oncostema dimartinoi* (Brullo & Pavone) F. Conti & Soldano, geophyte endemic to Lampedusa (Pelagie Islands) (Fig. 3), the increase in tourism over the years is a threat to the expansion of the species.

Discussion and conclusion

Considering that a part of the Sicilian endemic contingent has not yet received any evaluation of its status according to IUCN criteria, therefore, there is a need to further invest in research aimed at highlighting the real conditions of threat or conservation of the Sicilian endemic contingent which, due to its uniqueness, is not only of regional or national interest.

The increase in knowledge on the distribution and dynamics of populations in many taxa in the last years testifies that much remains to be explored even in a well-known geographical area such as Sicily where a large number of professional botanists work. Field research is a need for constant monitoring that many endemic taxa deserve. Although several actions have been launched at national and local level to protect the most sensitive environments, much still needs to be done to ensure the survival of the species that grow in these environments.



Fig. 3. Example of a direct threat from tourism on the natural population of *Oncostema dimartinoi* in Lampedusa Island.

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