

# *Ptilostemon greuteri*

A project towards conservation and a better understanding of a Sicilian narrow endemic plant species



## THE SPECIES

The evergreen *Ptilostemon greuteri* is one of the most striking members of the genus due to its large size (up to 3.5 m). The combination of size and growth form with a single woody stem is very unusual within the Mediterranean flora.

The tongue twisting name refers on the one hand to the feathery (*ptilo-*) filaments (*-stemon*, an element of the male flower parts) and on the other to the Swiss botanist Werner Greuter, a well-known specialist of the genus.

Characteristic are the rather big lanceolate leaves (sometimes up to 30 cm long!), with a snow-white, hairy underside, a protection against the high solar radiation in the Mediterranean climate. The inflorescence is also very large and branched with up to 9 flower heads, each bearing about 20 white to pink flowers. Especially conspicuous are the reddish purple outer bracts.

The woodiness and the large size of this species remind of the typical insular evolution of plants growing e.g. on the Canary Islands or Cape Verde Islands.

**1.** The characteristic white underside of the large, hairy and lanceolate leaves. (vp)

**2.** A flower head of *P. greuteri* in full bloom. (ag)

**3.** The two subpopulations of *P. greuteri* grow on Mount Inici in NW Sicily (red square), in the outskirts of Castellammare del Golfo.

**4.** The *P. greuteri* seeds bare an umbrella-like pappus favouring wind-dispersal. (vp)

**5.** *Ptilostemon greuteri* (in the lower left corner) in its natural rocky habitat in Sicily. It grows among other perennial species such as the Mediterranean dwarf palm (*Chamaerops humilis*, on the right). (vp)



## DISTRIBUTION

There are only two subpopulations of this species, located just outside the city of Castellammare del Golfo in the province of Trapani in Northwestern Sicily (Italy). Detailed maps are presented in a recent publication (Pasta et al. 2022).

The total number of reproducing individuals growing in the wild does not exceed 500. This very low number makes the species one of the rarest and most endangered species of the Mediterranean Basin.

## HABITAT

*Ptilostemon greuteri* grows on limestone cliffs and ledges as well as in Mediterranean maquis vegetation. It is however confined to the north-facing side of canyons, where it benefits from a more humid and less insolated microclimate. Among the other woody plants growing in the same habitat, we find species like the Mediterranean dwarf palm (*Chamaerops humilis*), the Cretan pincushion flower (*Lomelosia cretica*) and the tree wormwood (*Artemisia arborescens*).

In one of the populations, *P. greuteri* is found within a stone pine (*Pinus pinea*) plantation.



## DISCOVERY

The species was discovered in the 1980s, but was for a long time considered an escaped garden plant, due to its very unusual habit and the proximity of the population with an urban environment.

The formal description as a new species for science was made only in 2006 by two Sicilian botanists from the only known subpopulation at that time (Raimondo & Domina 2006).

A second subpopulation was discovered in 2006, a few kilometers further south on the north-facing slopes of a canyon.

## THREATS

As there are only two known subpopulations, the species is considered threatened and listed in the international red list of the IUCN as CR (critically endangered). Both subpopulations lie within a Special Area of Conservation.

Frequency and intensity of wildfires, logging or constructing activities might be a threat for the survival of the species. Habitat protection would probably be the simplest and most cost efficient way to protect the species. *Ptilostemon greuteri* may even play the role of a "flagship species" to protect the extremely rich botanical heritage of Mount Inici as a whole.

**1.** The magnificent view from one of the *P. greuteri* subpopulations to the Tyrrhenian Sea and Castellammare del Golfo. (ag)

**2.** Freely grazing goats in the habitat of *P. greuteri* represent a potential threat to the plants. (gk)

**3.** Scientists setting up a pollination experiment. (gk)

**4.** In each of the two subpopulations, a weather station was installed in order to measure precise on-site climate conditions. (gk)

**5.** Scientist monitoring the very big *P. greuteri* plants. (ag)

## THE PROJECT

The main aim of the project is to improve the conservation status of the species by creating and implementing an action plan, which summarises all information needed to protect the species efficiently and in a long term perspective. To this goal, we first need to gain more knowledge about *P. greuteri*, its habitat as well as past, current and predicted threats. This is done by studying its demographic patterns (e.g. number and age), ecological requirements (e.g. air and soil temperature and humidity, soil structure and decomposition rate) and the topographic characteristics of the sites and plant communities where the species grows. On site pollination and germination tests are carried out to better understand reproduction and recruitment patterns.

A detailed digital map of each subpopulation was created and provides important information about the distribution pattern of the species.

Vegetation surveys, microclimatic data collection and in-depth study of the demographic structure of the subpopulations will allow to determine the realized niche of *P. greuteri*. This type of analysis helps define potentially suitable sites



either to find new and unknown subpopulations of *P. greuteri* or for future translocation projects.

Seed collection is important to safeguard the genetic diversity of the species. Seeds will be used in translocation activities to establish new subpopulations in adequate and protected habitats. This will allow to increase the number and the spatial heterogeneity of subpopulations and to help prevent the total destruction of all reproductive individuals. The remaining seeds will be sent to other research institutions (botanical gardens and seed banks) for ex-situ conservation purposes.

Local topographic and climatic factors appear to be crucial for the survival of the species. However the influence of extreme climatic events, the effects of grazing and the impact of wildfires may also play a key role in the long-term survival of the species.

**1.** Ex-situ cultivation is a tool to prevent the extinction of species, as here in the Botanical Garden of the University of Fribourg, Switzerland. (gk)

**2.** General view of the location of one subpopulation: in-situ protection is an important tool for the conservation of *P. greuteri*. (nk)

**3.** The future is green! This *P. greuteri* seedling shows the ability of the species to regenerate in-situ. (gk)

**4.** Collecting seeds for germination experiments. These results may help to better understand essential requirements for the survival of the species. (vp)

**5.** Stunning Mediterranean maquis vegetation on Mount Inici. (gk)

## FURTHER DEVELOPMENTS

A regular monitoring and the protection of the sites hosting the two remaining subpopulations of *P. greuteri* must be a main target.

Additional investigations on the ecological requirements of the species are needed: only little is known e.g. on the dispersal strategies and establishment of juvenile plants as well as the reaction of *P. greuteri* to fire events and its dependency on a certain fire frequency and/or intensity to propagate.

A thorough search for further, probable yet tiny populations in the mountains around Castellammare del Golfo and other suitable habitats in NW Sicily should be launched. This could lead to the discovery of not only new, so far undetected subpopulations, but also of suitable habitats, where this enigmatic plant could be introduced in order to reduce the extinction risk of one or both known subpopulations.



## INTERNATIONAL COLLABORATION

The long-lasting experience of the team of the Botanical Garden of the University of Fribourg (Switzerland) about rare and/or relict woody species and the long-standing and highly developed skills of the Sicilian partners from the Institute of Biosciences and BioResources in Palermo (Italy) led to this collaboration. The project is generously supported by the **Fondation Audemars Piguet** (Switzerland).

Project partners:

**Prof. Gregor Kozłowski, Dr. Laurence Fazan, Dr. Nicolas Küffer** and **Viviane Perraudin** are biologists working at the Botanical Garden of the University of Fribourg, an important centre for the study of relict woody plant species. Their work focuses on the ecology, distribution and conservation of trees as well as of alpine and aquatic plants.

**Dr. Alessandro Silvestre Gristina, Dr. Salvatore Pasta** and **Dr. Giuseppe Garfi** are scientists working at the Institute of Biosciences and BioResources in Palermo. Their projects target mainly a better understanding, scientific knowledge and conservation of rare plant species. **Dr. Corrado Marcenò** currently works at the University of Perugia as a senior researcher. **Prof. Riccardo Guarino** is a vegetation ecologist working at the University of Palermo.

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### IMAGE CREDITS

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