



Global Re-introduction Perspectives: 2016

Case-studies from around the globe

Edited by Pritpal S. Soorae



IUCN/SSC Re-introduction Specialist Group (RSG)



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v. Tasmanian Devil, Maria Island, Tasmania @Simon DeSalis
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Moris's pink re-introduction project in Sardinia, Italy

Donatella Cogoni, Giuseppe Fenu, Erica Concas & Gianluigi Bacchetta

Centro Conservazione Biodiversità, Dipartimento di Scienze della Vita e dell'Ambiente, Università degli Studi di Cagliari, Viale S. Ignazio da Laconi 11-13, I-09123 Cagliari, Sardinia, Italy.

(d.cogoni@unica.it; gfenu@unica.it; concas.eric@tiscali.it; bacchet@unica.it)

Introduction

The Moris's pink (*Dianthus morisianus* Vals.) (Caryophyllaceae) was listed in the National Red List as Endangered and in the Regional Red List as Vulnerable; the small size of the population and the limited seedling recruitment make *D. morisianus* potentially prone to extinction, and, more recently, it is categorized as Critically Endangered on the European and Global Red Lists (Cogoni *et al.*, 2013 and references therein). Preliminary research focused on the ecology of *D. morisianus* and the level of human disturbance in its habitat. These surveys facilitated the identification of a suitable area ~150 m from the natural population, in a protected site, managed by public administration (EFS, Ente Foreste della Sardegna - Regione Sardegna); the chosen site was most likely a part of the species' former range and had not been greatly altered by human activities.

Goals

- Goal 1: To contribute to the recovery of threatened species.
- Goal 2: To increase the population size.
- Goal 3: To determine the conditions under which we might expect plant species re-introductions to be most successful.
- Goal 4: To make the results of this project available for future plant re-introduction trials.



Moris's pink

Success Indicators

- Indicator 1: Survival rates.
- Indicator 2: Number of established seedlings.
- Indicator 3: Number of seedlings becoming reproductive.
- Indicator 4: Flowering and fruiting rates per plant.
- Indicator 5: Mean number of fruits/seeds per plant.

Project Summary

Feasibility: *Dianthus morisianus*, is the only psammophilous species of the genus in the Mediterranean basin and with only one population located on the Portixeddu coastal dune system (Buggerru, South-West Sardinia). The natural habitat of *D. morisianus* has been strongly modified by human activities, causing habitat loss and fragmentation: there are several settlements in the species'



Planting Moris's Pink at the release site

habitat and since 1950 much of the dune system has been afforested to stabilize the dunes and halt the movement of sand inland (Cogoni *et al.*, 2013).

Implementation: Seedling emergence and establishment are the most critical stages in the life cycle of *D. morisianus* (Cogoni *et al.*, 2012) and therefore juvenile plants were used for the re-introduction. Seedlings germinated from seeds collected in different years were used to facilitate the inclusion of some genetic diversity. Fruits were collected from the wild population in 2008 and 2009, by sampling 50 mature plants in each year. In a laboratory, 200 seeds (100 per collection) were sown and incubated at the optimal germination temperature (15° C; Cogoni *et al.*, 2012). Subsequently, all the seedlings were placed in pots with sand collected in the species' habitat. Successful growth requires adaptation to environmental conditions and thus propagation requires hardening, to decrease the stress of planting out and increase survival; accordingly, no horticultural treatments were adopted.

In November 2010, the 113 surviving plants (50 and 63 from the first and the second sowing, respectively) were re-introduced to the chosen site. The plants were placed in nine groups at a mean distance of ~15 m from each other; the location of each group was determined by the availability of suitable microhabitats (Cogoni *et al.*, 2013). A second re-introduction was done during 2011, on an unprotected site (Fenu *et al.*, 2015).

Post-plantation monitoring: The transplanted plants were marked and monitored monthly recording the following parameters: 1) number of plants surviving, 2) number flowered, 3) fructified plants, 4) number of flowers and fruits/seeds per plant, and 5) number of new established seedlings.

The survival rate was high, with few plants dead in the first year (96%) and those remaining were alive after 24 months. About 40% and 65% of the plants became



Pots of Moris's pink placed in holes before being covered with soil at the release site

reproductive in the first and second years, respectively. The mean number of fruits per plant was $3.84 \pm \text{SE } 2.48$ and $7.97 \pm \text{SE } 7.11$ in the first and second years, respectively, higher than that in the natural population (2.60 ; Cogoni *et al.*, unpubl. data). The number of seedlings produced by the re-introduced plants (87) is higher than recorded in the natural population, where seedlings comprise 9.95% of the population (Cogoni *et al.*, 2013 and unpubl. data).

Major difficulties faced

- Site selection: Difficulties in finding suitable ecological patches considering the high level of human alteration of the coastal dune system.
- Grazing limitation: There is intensive grazing present in the area linked to domestic and wild animals that eat the stems and fruits.
- Summer drought: In the Mediterranean coastal dune it represents a critical factor for plant persistence. In fact, the summer aridity in this coastal area, extends to late spring until autumn and often high-temperature peaks coincide with the lowest rainfall levels during the year. Given the role that some of these factors may play as selective pressures on flowering times.

Major lessons learned

- Select an appropriate microhabitat, something unique to each taxa, is a key feature for successful plant re-introduction.
- Successful re-introduction requires adaptation to environmental conditions and thus propagation requires hardening, to decrease the stress of planting out and increase survival; accordingly, no horticultural treatments were adopted.
- To select the appropriate season to carry out the re-introduction and in the Mediterranean coastal dunes the best season is during autumn.
- Choice of an area managed by public administration (EFS, Forestry Agency of Sardinia) - conservation of threatened plants is more practicable on legally protected than on private land.
- To work in collaboration with public authorities and local stakeholders.

Success of project

Highly Successful	Successful	Partially Successful	Failure
√			

Reason(s) for success/failure:

- High number of survived transplants.
- High number of seedlings established.
- High rate of reproductive plants.
- High rate of flowering and fruiting.
- High number of seeds per plant.

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INTERNATIONAL UNION
FOR CONSERVATION OF NATURE

WORLD HEADQUARTERS
Rue Mauverney 28
1196 Gland, Switzerland
Tel +41 22 999 0000
Fax +41 22 999 0002
www.iucn.org

