



Restocking meadow and pasture orchid populations in Lombardy, Italy

S. Pierce*, D. Turrit, A. Ferrario†, R. M. Ceriani†, M. Villa††, B. E. L. Cerabolini*

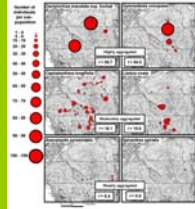
* Dipartimento di Biologia Strutturale e Funzionale, Università degli Studi dell'Insubria, Via J.H. Dunant, 3 - 21100 Varese, Italy
 † Centro Flora Autoctona della Regione Lombardia, Consorzio Parco Monte Barro, via Bertarelli 11, I-23851 Galbiate (LC), Italy
 ‡ Parco delle Orobie Bergamasche, Via Canozzi 111, I-24121 Bergamo, Italy



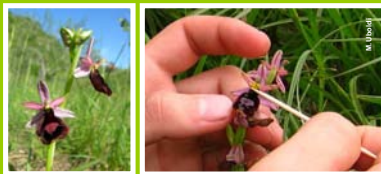
Many of Europe's rarest orchids have become so decimated that not even habitat conservation can now ensure their future: small populations have difficulty attracting pollinators and plants may be so inbred that seed is infertile. We aim to identify threatened populations of Orchidaceae in Lombardy, to reduce the effects of inbreeding depression, to propagate plants from seed and ultimately to reinforce wild populations and re-establish populations in historical habitats.

The restocking procedure

1 • Comparing the degree of population aggregation allows us to identify "at risk" populations. Highly aggregated populations (large groups restricted to a particular habitat) respond well to habitat conservation, but diffuse (weakly aggregated) species are rare even in the correct habitat and are at greatest risk of inbreeding depression. These do not respond well to habitat conservation alone, benefiting from additional ex situ conservation and population reinforcement.
 Pierce et al. 2006. *Conservation Biology* 20(6), 1804-1810.



2 • Hand pollination can alleviate the effects of inbreeding, particularly when pollen is transferred between populations. We found that both pollen and ovules from a small population of the endemic Insubric Bee Orchid (*Ophrys benacensis*) exhibited developmental problems resulting in the production of infertile seed, but this was remedied by fertilisation with pollen from larger populations.



Pierce et al. 2010. *Plant Biosystems* 144(1), 121-127.

3 • In vitro germination and cultivation methods are optimised by comparing the performance of each species on different substrates and in different environmental conditions.



4 • Plantlets are "deflasked" and cultivated in pots for several years.



Ophrys benacensis, produced in vitro, flowering at the CFA

Ophrys sphegodes

5 • Dormant tubers of mature plants are transplanted into the wild in late summer to restock the original populations or for reintroductions. Populations are monitored to ensure a positive intervention



A three-year old seedling of *Ophrys benacensis* produced in our laboratory

Some of more than 60 plants of *Ophrys benacensis* transplanted at Parco Monte Barro

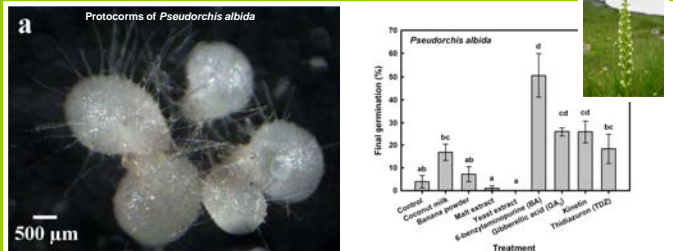
Population size and pollination problems

How large does a population have to be to successfully attract pollinators and have a low risk of inbreeding depression? Part of the project is investigating the reproductive biology of different populations, particularly of alpine species, in order to answer this question.



Germination and cultivation

The project has included some notable successes, such as the production – for the first time in the world – of a method for the *in vitro* germination and cultivation of the Small White Orchid (*Pseudorchis albida*). Over 10 000 plants have been produced for the 17 species in the project.



Pierce & Cerabolini 2011. *Seed Science & Technology* 39(1), 199-203.

Particularly rare orchid species

A number of orchids are known to be particularly rare in Lombardy, and the project has developed or refined protocols for the propagation of some of Europe's rarest.



Pollination of *Cypripedium calceolus*

Cephalanthera rubra

Protocorms of *Cypripedium calceolus*

Orchis papilionacea

Orchis laxiflora

Education

Promoting public awareness of biodiversity issues is an integral part of the project, carried out using open days when the public are introduced to our facilities, and by producing "biodiversity gardens" with plants we have propagated. These are accessible both at Monte Barro park and at hostels throughout the mountains in the Orobie Bergamasche park.



CAI Rifugio F.lli Longi, site of one of our biodiversity gardens

The project was funded by the Cariplo Foundation

The Native Flora Centre of the Lombardy Region (Centro Flora Autoctona della Regione Lombardia, CFA) is a Regional Body managed by Parco Monte Barro (LC), that promotes the study, conservation and cultivation of native Lombard plants to aid plant conservation and environmental engineering activities within the territory. For more information, visit the website: <http://centroflora.parcomontebarro.it>



CAI Rifugio Gherardi, site of one of our biodiversity gardens