



Island Biology 2023

Ecological and Evolutionary Processes on Real and Habitat Islands

BOOK OF ABSTRACTS

4th Conference of the Society of Island Biology
(2-7 July 2023, Lipari, Italy)

Edited by
Simone Fattorini

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Island Biology 2023: Ecological and Evolutionary Processes on Real and Habitat Islands

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Towards a mechanistic understanding of plant invasion on islands: the case of the Compositae family in the Canary Islands

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Invasive species are recognized as one of the most important threats to biodiversity. Oceanic islands harbor a fragile and unique native biota that make them especially vulnerable to biological invasions, among other human-induced disturbances. However, the mechanisms behind the invasive success remain uncertain. Charles Darwin proposed two competing hypotheses to predict the species invasive potential, known as the Darwin's Naturalization Conundrum (DNC). First, the "pre-adaptation hypothesis" proposes that species closely related to the native community will have a higher probability of invasion because they have similar life-history traits that make them pre-adapted to establish and thrive under the same local environmental conditions. Alternatively, the "naturalization hypothesis" predicts that species distantly related to native species can exploit empty niches and avoid competitive exclusion, having a higher invasive potential. These two opposite hypotheses, which rely on environmental and biotic filtering, respectively, can decisively contribute to determine invasive success. In practice, the study of the DNC can be addressed by assessing two different dimensions of relatedness between species: phylogenetic and functional distance. Herein we present the preliminary results of a long-term project that aims to test the DNC in the Compositae family across the oceanic archipelago of the Canary Islands. From a super-phylogeny that includes all the genera and most of the species present in the archipelago, we estimated the phylogenetic relatedness between alien, non-endemic native and endemic species. In addition, functional traits were measured from all the species collected in the field and subsequently functional distances were calculated between the three functional groupings. Integrating both phylogenetic and functional approaches, it allows us to explicitly assess the invasive potential of insular alien species under the framework of the DNC.

Plant conservation in the Aeolian Islands: bringing species back from the brink of extinction

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The Aeolian Islands harbor high plant diversity, counting about 750 native taxa, of which eight are endemic to the archipelago. The recent age of the islands and their continuous volcanic activity impacted on the number of endemic taxa and contributed to the fragmentation of their populations. These taxa are particularly precious for their biogeographical value but are at high risk of extinction due to their reduced distribution and human activities' impact. The Seed Bank of the University of Catania is involved in two international projects for the conservation of four threatened Aeolian plants. The Interreg Italia-Malta SiMaSeed PLUS deals with the reinforcement of *Anthemis aeolica* Lojac., reduced to a single population on the islet of Lisca Bianca, close to Panarea. The LIFE project SEEDFORCE focuses on the conservation of 29 Annex II species of the 92/43 EU Directive "Habitat" with unfavorable conservation status. Of these, three species grow in Aeolian islands: *Cytisus aeolicus* Guss. and *Silene hicesiae* Brullo & Signor., endemic to the archipelago, and *Echiochloa saxicola* (Guss.) Freitag & G.Kadereit, endemic to the South Tyrrhenian Sea. Both projects aim at using the seeds for ex-situ conservation and to produce plants for the reinforcement of extant populations or for their reintroduction in sites where they went extinct. Seed germination and plant establishment are key stages of plant life but few data are available on the four target species. Therefore, germination and cultivation protocols are being developed, genetic analysis of the donor populations will inform on the best provenance of the seeds to be used, and the trophic relationships (pollinators) are being investigated. To ensure that the conditions in the intervention sites are suitable for the maintenance of viable populations threats are analyzed and mitigated. Finally, ex-ante and ex-post monitoring will produce data on the reinforcements' success and on the demography of these species.