The vegetation of Berlengas’ island: an attempt to promote the recovery of Armeria berlenguensis (Plumbaginaceae)

Introduction

The Berlengas archipelago is in the Atlantic Ocean, on the Portuguese continental shelf, on the western side of Iberian Peninsula, close to Cape Carvoeiro (Peniche). It distances approximately 5.7 miles from mainland. Berlengas was firstly classified as Natural Reserve in 1981. In 1998 this area was reclassified as Marine Reserve Area increasing its territory to its present size (104 ha) (Amado et al., 2007). In 2011, the International Coordinating Council of UNESCO’s Man and the Biosphere Programme (MAB) included the Berlengas archipelago in the World Network of Biosphere Reserves (WNBR), demonstrating the importance of this natural reserve worldwide, proving the importance of this archipelago as a repository of genetic diversity, of species and habitats on the most western area of continental Europe. Therefore, the Berlengas archipelago hosts important features, due to its insular nature, its geological characteristics, its geographical location and climate, the presence of the Nazaré Canyon, a submarine canyon, along with a low human interference motivated by the small size of the islands and land scarcity. Altogether, these characteristics contributed to promote local high biodiversity, either endemic terrestrial plant species, marine bird species, marine invertebrates, fish or marine mammals (Amado et al., 2007; Queiroga, et al., 2008).

As a result of insular isolation, as well as to severe climatic and edaphic conditions, Berlengas terrestrial flora evolved rapidly and quite differently from the species of mainland. In fact, these plants struggle to survive with extreme dryness, little soil, strong winds and salt. Most of the plants are thicker and smaller in size, with hairy reduced leaves, avoiding being destroyed by wind and excess evaporation. These harsh conditions lead to selection pressures that differentiated these endemic species, of great conservation value: Armeria berlenguensis, Herniaria lusitana subsp. berlengiana and Pulicaria microcephala. Two of these species – A. berlenguensis and H. lusitana subsp. berlengiana are registered in Annex 2 of the Habitats Directive, due to their conservation relevance, and are considered critically endangered and endangered, respectively, according to IUCN (Draper, et al. 2003; IUCN, 2017a, 2017b).

Other species of the shore can be found here, some of them having a restricted geographical distribution, either Iberian or Iberian and north Africa: Angelica pachycharpa, Calendula suffruticosa subsp. algarbiensis, Echium rosulatum, Linaria amethystea subsp. multipunctata, Narcissus bulbocodium subsp. obesus, Silene latisilacea subsp. maritizia, Silene scarboriflora and Scorphularia sublurata (Queiroga, et al., 2008). Although, the endemic and halophyte flora of Berlengas is still flourishing, it is being threatened by several factors. To begin with, the introduction, in late 1950s, of the species, an invasive species that until recent years was spreading out over the cliffs and hillside of these islands. Another threat is the oversized population of seagulls that nest on the larger species of Armeria berlenguensis, destroying them. Finally, the increasing number of ruderal plant species that lives on the litter produced by the seagulls, in order to modify natural floristic composition (Taulenge Gomes, Draper, & Rosseló-Graell, 2001).

Therefore, the control of seagulls has been undertaken for more than ten years and in 2014 a project for the recovery of the Berlengas ecosystems has begun – LIFE BERLINGAS, including the removal of Carabopterus edulis. Since May 2015, we installed several areas with metal pillars and fishing line, preventing the access of seagulls and other birds. The vegetation of these “exclusion areas” and other equivalent free areas have been monitored seasonally to access the evolution of the vegetation in the past three years, namely the number of Armeria berlenguensis, the height of the specimens present and the number of species.

Methods

Installation of 10m x 10m study areas A1-A6 (with Armeria berlenguensis present) and B1-86 (without the species present) in may 2015. A1-A3 and B1-86 are “exclusion zones”, with structures built from pillars and fishing line, preventing the access of birds and other animals to study areas.

Results

The PCA showed that 47.3% of total variance was explained by the two principal components. PC1 expressed 32.4% of total variance, which is the most significant response regarding the separation between structure treatments. This demonstrates that the percentage of cover of A. berlenguensis (respectively, Anacrusa undulata, and Plantago coronopus increases with the presence of the structures, for all years, mainly in May (followed by August). These results reinforce, thus, that the absence of disturbance seems to favour the growth of the rupical A. berlenguensis but also of some ruderal species. Moreover, Echium rosulatum and Calendula suffruticosa subsp. algarbiensis presented higher cover percentages without A. berlenguensis (with and without structures), as they are ruderal species tending to rapidly occupy available nitrophilous soil. On the other hand, Lobularia maritima, Mercurialis ambigua, Scorphularia sublurata, Urtica membranacea and Erodium cicutarium increased in A. berlenguensis areas without structure, for all analyzed years, mostly in autumn and winter samples. In general, those species presented a null correlation with A. berlenguensis, Anacrusa undulata, Plantago coronopus, Echium rosulatum and Calendula suffruticosa subsp. algarbiensis.

Conclusion

Overall, there seems to be a recovery of the vegetation of the island, either rupical or ruderal species. Besides PCA, data indicate a slight correlation between the presence of the protection structure and the number of A. berlenguensis specimens. Still these results need to be extended in time, so that this trend can be confirmed.

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