Rules of thumbs are sometimes valid: very low genetic diversity in two ENEs from Majorca Island (W Mediterranean)

Sergi Massó1,2, Jordi López-Pujol2, M. Carmen Martinell1, Javier López-Alvarado3, Llorenç Sáez3,4 & César Blanché1.

1BioGReB, Laboratori de Botànica, Facultat de Farmàcia, Universitat de Barcelona, Avinguda Joan XXIII s/n, 08028 Barcelona, Catalonia
2BioGReB, Botanic Institute of Barcelona (IBB-CSIC-ICUB), Passeig del Mígdia s/n, 08038 Barcelona, Catalonia
3Unitat de Botànica, Facultat de Biociències, Universitat Autònoma de Barcelona, 08193 Barcelona, Catalonia
4Societat d’Història Natural de les Illes Balears, C/ Margarida Xirgo 16, baixos, 07011 Palma de Mallorca, Illes Balears

EXTEREMELY NARROW ENDENIMES, WHAT’S THIS?

According to López-Pujol et al. (2013) Extremely Narrow Endemics (ENEs) are defined as those taxa that occur in one or very few populations (≤55) and that exhibit very small census sizes (≤500 individuals). ENEs, and particularly those from islands, usually display low levels of genetic diversity which is driven by several factors including: (1) bottlenecks associated with the founder effect, (2) the small size of island populations favoring genetic drift and inbreeding, and (3) genetic adaptation to island ecosystems.

THE PUIG MAJOR PEAK

The Puig Major Peak, in the Tramuntana mountain range, is the highest point on the Mediterranean island of Majorca with 1,436 m a.s.l. Despite its small extent, the Puig Major Mountain is an area with an extraordinary concentration of endemic plant species. This mountain occupies less than a single UTM 10x10 km square but has the highest concentration of endemic plant species of the Balearic Islands. In fact, four ENEs are restricted to the mountain area included in this UTM square: Agrostis barceloi, Anerania bolosi, Coristospermum huteri, and Euphorbia fontqueriana.

CORISTOSPERMUM HUTERI

Coristospermum huteri (Umbelliferae) is a hemicryptophyte which grows in crevices of karstic cliffs in shaded, moist places and restricted in a single natural population of ca. 100 individuals. Allozyme electrophoresis was used to survey genetic variation in 63 individuals and 12 different loci were solved. All loci were monomorphic, with the sole exception of 6Pgd-2. This locus exhibited two different alleles, which are responsible for the three alternative mutliculicous genotypes observed within the population: eight individuals were homozygotes for the slow-migrating allele (6Pgd-2b); three were heterozygotes, and the remainder (including the seven reintroduced individuals) were homozygotes for the fast-migrating allele (6Pgd-2a). Genetic variability was virtually nil for this species (P = 8.3%, A = 1.08, Hs = 0.022). A founder effect associated with a dispersal event from the continent is probably behind the lack of genetic diversity.

AGROSTIS BARCELOI

Agrostis barceloi (Gramineae) is a tetraploid shortly rhizomatous perennial grass with a single natural population of 70-80 individuals. It grows on shady slopes and vertical limestone cliffs and in small patches of shady meadows. All 40 analyzed samples showed the same genotype using allozyme electrophoresis. Four out of 18 interpretable loci (Idh-2, Mdh-2, Pgi-2 and Ppx-3) showed fixed heterozygosity (thus supporting an allopolyploid origin) and moderate levels of genetic diversity were obtained (P = 22%, A = 1.22, Hs = 0.113). The genotypic uniformity of this species may be attributed to a founder effect associated with a dispersal event of its ancestor from the continent, a very small current effective population size, and a series of natural or anthropogenic threats affecting the population.

CONCLUSIONS

Within the context of the conservation plan for the Puig Major flora approved by the regional government (BOIB, 2008), some conservation measures are proposed: (1) control of herbivory by fencing, (2) control of competitor species, (3) demographic monitoring, (4) maintenance of ex-situ collections, (5) population reinforcement, (6) environmental awareness campaigns and (7) the reservation of the mountain summit where the species are found which would also positively influence the conservation of other co-occurring rare and threatened species.

ACKNOWLEDGEMENTS

We thank to the staff of Servei de Conservació d’Espècies del Govern de les Illes Balears for their assistance in collecting samples. An ADR fellowship (Universitat de Barcelona) and a postdoctoral Beatrix de Pinós fellowship (Generalitat de Catalunya) were awarded to S. Massó and J. López-Pujol respectively. Some parts of this research was financed by Ministerio de Educación y Ciencia (grant CG 2007-60475/BOS).

REFERENCES

BOIB. 2008. Resolución del consejero de Medio Ambiente de 26 de noviembre de 2008 por la que se aprueban el plans de recuperació de Vice Altimüll, d’aus aquàtiques catalogades en Perímet d’Extinció de les Illes Balears (Pla Femtorray) y el pla de conservacion de la flora vascular amenaçada del Puig Major i els plans de maneig del les Taus boscals i del volturi negre Aegypius monachus. Butlletí Oficial de les Illes Balears, 2008(77): 8-72.
