Poblacions marginals: valor en conservació

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Les poblacions de plantes a l'extrem/perifèria de llur àrea de distribució han rebut diversa atenció per la seva vulnerabilitat o per la seva diferenciació genètica més o menys marcada. Tres articles recents sobre espècies de la nostra flora (*Cypripedium calceolus, Cyclamen balearicum* o *Dichoropetalum schottii*) aporten noves dades per a interpretar correctament aquestes poblacions extremes.

D'una banda, Garcia *et al* (2010), tot partint de la consideració establerta que les poblacions marginals de l'àrea de distribució de les espècies són més vulnerables que les poblacions centrals, es fan ressò de revisions recents que posen en dubte aquesta generalització. Tot examinant el rendiment reproductiu i demogràfic de poblacions pirinenques de *Cypripedium calceolus*, orquídia-insignía de la conservació de flora a Europa, conclouen que, contràriament a les expectatives, les poblacions estudiades (marginals) tenen millors resultats d'èxit reproductiu i de taxes de creixement que no pas les poblacions de l'àrea central i ho relacionen amb la reforestació dels darrers 50 anys a les muntanyes del sud d'Europa.

L'equip del BioC, ha analitzat els nivells de diversitat i l'estructura genètica de la població ibèrica extrema (SW) de *Dichoropetalum schottii* en el conjunt de l'àrea de distribució (Blanché *et al,* en premsa). Els resultats (nivells més baixos de diversitat isoenzimàtica) són congruents amb la petita mida poblacional i amb la situació marginal excèntrica respecte a l'àrea de distribució total. Tanmateix, el nucli pirinenc en conjunt (poblacions de la Garrotxa i de l'Arièja) pot ser distingit com una fracció significativa de la variació genètica de l'espècie, caracteritzada per la presència d'al·lels privats i per un origen relativament recent, a partir d'una estirp procedent de les muntanyes mediterrànies orientals. El conjunt de poblacions pirinenques és identificable com a unitat funcional de conservació, per a la qual es proposen mesures de conservació.

D'altra banda, Thompson *et al* (2010) analitzen el fenomen de la hibridació en poblacions marginals extremes (Còrsega) d'una parella de tàxons de distribució ampla/restringida (*Cyclamen repandum/C. balearicum*). L'estudi confirma la introgressió genètica de l'espècie gran en l'endèmica, però conclou que l'estratègia de conservació hauria d'incorporar precisament aquestes poblacions híbrides marginals per tal com són una font de nova diversitat genètica amb potencial valor adaptatiu per a l'espècie d'àrea reduïda. Contràriament al temor a la "contaminació" genètica, l'article destaca, sempre que el fenomen es mantingui en nivells adequats, el valor de mantenir aquests processos, en línia amb les darreres revisions que rebaixen la noció de risc de la outbreeding depression, fins ara considerada un perill que alguns autors destacats miren de relativitzar (*cf.* Frankham *et al* , 2011)

En conjunt, doncs, les dades recents segueixen apuntant a l'interès que tenen les poblacions extremes i marginals (ni que es presentin empobrides genèticament o que pateixin fenòmens d'introgressió), la diversitat de fenòmens que hi tenen lloc i la rellevança que siguin considerades com a unitats especials mereixedores de mesures de conservació. I, en especial, mereix ser destacat que aquestes recerques provenen de tàxons de la nostra flora, que comença a fornir dades al coneixement que, fins fa poc, era exclusiu d'altres territoris florístics.

RESUMS I ACCÉS ALS DOCUMENTS CITATS

- **Blanché, C., M.C. Martinell, J. López-Pujol, S. Massó, M. Bosch, A. Rovira & J. Simon** (in press) Estructura i diversitat genètica de les poblacions pirinenques de *Dichoro petalum schottii* (Bess.) Pimenov & Kljuykov (Apiaceae): avaluació per a l'establiment de prioritats en conservació. *Actes del Col·loqui de Botànica Pirenaico-Cantàbrica,* Institut d'Estudis Andorrans, Ordino.

Abstract

Dichoropetalum schottii is a taxon of S. European mountains reaching its western distribution limit at the Pyrenees. A single Iberian location is known, hosting c. 250 individuals (CR according to IUCN 2001 categories). It is also known in France from some ten localities in the Eastern Pyrenees and protected by law in Catalonia and Languedoc-Roussillon. Allozyme variation of Pyrenean populations has been studied. Parameters of genetic variation (*P99, A, He*) for eight loci show lower values for the Catalan population (25.0; 1.37; 0.100, respectively) than for the remaining Pyrenean populations (37.5-50; 1.50; 0.112-0.134), in congruence with small population size and marginal excentric situation in relation with the total distribution area. By comparing the obtained data with those of populations of the whole distribution area, we conclude that the Pyrenean populations set can be distinguished as a significant portion of genetic variation, characterized by private alleles and by a relatively recent origin, coming from an E-Mediterranean mountain stock. The set of Pyrenean populations can be identified as a functional conservation unit for which conservation measures are proposed.

- **Frankham R, Ballou JD, Eldridge MDB, Lacy RC, Ralls K, Dudash MR & Fenster CB** (2011) Predicting the probability of outbreeding depression. *Conservation Biology* . 25 (in press).
Enllaç a l'article

Abstract

Fragmentation of animal and plant populations typically leads to genetic erosion and increased probability of extirpation. Although these effects can usually be reversed by reestablishing gene flow between population fragments, managers sometimes fail to do so due to fears of outbreeding depression (OD). Rapid development of OD is due primarily to adaptive differentiation from selection or fixation of chromosomal variants. Fixed chromosomal variants can be detected empirically. We used an extended form of the breeders' equation to predict the

probability of OD due to adaptive differentiation between recently isolated population fragments as a function of intensity of selection, genetic diversity, effective population sizes, and generations of isolation. Empirical data indicated that populations in similar environments had not developed OD even after thousands of generations of isolation. To predict the probability of OD, we developed a decision tree that was based on the 4 variables from the breeders' equation, taxonomic status, and gene flow within the last 500 years. The predicted probability of OD in crosses between 2 populations is elevated when the populations have at least one of the following characteristics: are distinct species, have fixed chromosomal differences, exchanged no genes in the last 500 years, or inhabit different environments. Conversely, the predicted probability of OD in crosses between 2 populations of the same species is low for populations with the same karyotype, isolated for <500 years, and that occupy similar environments. In the former case, we recommend crossing be avoided or tried on a limited, experimental basis. In the latter case, crossing can be carried out with low probability of OD. We used crosses with known results to test the decision tree and found that it correctly identified cases where OD occurred. Current concerns about OD in recently fragmented populations are almost certainly excessive.

- **García, M.B., D. Goñi & D. Guzmán** (2010) Living at the Edge: Local versus Positional Factors in the Long-Term Population Dynamics of an Endangered Orchid.
Conservation Biology
, 24: 1219–1229.
Enllaç a l'article

Abstract

Populations at the margin of geographic ranges of distribution have been considered more vulnerable than central ones, but recent reviews have caste doubt on this generalization. We examined the reproductive and demographic performance of a rare Euroasiatic orchid (*Cypripedium calceolus*
) at its southwesterly range limit and compared our findings with those of previous studies of nine central populations at the center of the orchid's range. We sought to test the central-marginal model and to evaluate factors involved in long-term performance of forest

Eurosiberian species with peripheral populations in southern European mountains. We characterized (structure, temporal fluctuations, herbivory, reproductive success, and recruitment at different habitats) four Pyrenean populations of
C. calceolus
of different sizes (5–3500 ramets) and monitored three of them for up to 13 years. Two quantitative stochastic models (count data and matrix models) were used to assess population trends and viability and the effect of herbivory. Contrary to expectations, and despite the negative effect of sporadic events of herbivory, the peripheral populations we studied (except the smallest one) performed similarly or better than populations occurring in central part of the species' range in terms of reproductive success and population growth rates. Landscape changes over the last 50 years suggest that natural reforestation could be involved in the success of this plant at its southern limit. Forest expansion in the mountain regions of southern Europe may provide new opportunities for plants with geographic distributions centered mainly at higher latitudes and give some hope for their recovery in future scenarios dominated by biodiversity loss.

- **Thompson, J.D., M. Gaudeul & M. Debussche** (2010) Conservation Value of Sites of Hybridization in Peripheral Populations of Rare Plant Species
. Conservation Biology
, 24: 236–245.
Enllaç a l'article

Abstract

Populations at the periphery of a species' range are of interest to conservation biologists because they can show marked genetic differentiation from populations at the center of a range and because of potential hybridization among rare and common species. We examined two closely related *Cyclamen* species. One is a narrow endemic, and the other is more geographically widespread (both protected by law in continental southern France). We used floral traits and genetic variability to test for hybridization among the species in peripheral populations of the rare species. The species co-occurred on Corsica in a disjunct, peripheral part of the distribution of the endemic species and in an ecologically marginal area for the

widespread species. The two species have hybridized and the endemic species showed high levels of introgression with its widespread congener. Genetic and floral variability in sites with both species was markedly higher than in sites with a single species. Our results highlight the need for a conservation strategy that integrates hybrid populations because they represent a source of novel diversity that may have adaptive potential.

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