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GENETIC VARIATION AND ADAPTIVE POTENTIAL TO ENVIRONMENT IN FIVE SUB-ALPINE CONIFEROUS SPECIES

Forest ecosystems form a dominant landscape in many Alpine environments where natural populations of coniferous species are found across steep environmental gradients. Such populations are supposed to be tightly genetically adapted to these diverse environments; however the genetic basis of adaptation is still poorly understood. The present study investigated the genetic pattern of five ecologically and economically important conifer species for the Italian Alps and Apennines: *Abies alba* Mill., *Larix decidua* Mill., *Picea abies* (L.) Karst, *Pinus cembra* L. and *Pinus mugo* Turra. Natural populations (from 24 to 36) of these species were sampled across the Italian species range, with a sampling core on the eastern Alps. Sampled trees were genotyped for Single Nucleotide Polymorphisms (SNPs) markers. Genetic data were first used to investigate the pattern of population structure within each species, using a Bayesian clustering analysis. The presence of 3 genetic clusters for *A. alba* and *L. decidua*, and 4 for *P. abies*, *P. cembra* and *P. mugo* was revealed. The association between genetic variation and environmental variables was then tested using a multivariate analysis and a Bayesian simulation, accounting for the inferred genetic structure. Genetic variation resulted significantly correlated with geographic position in all five species: latitude was highly significant for *A. alba* and longitude for the other species. As regarded to climatic variables, the Bayesian simulation identified a positive association between genetic variation (SNPs frequency) and winter precipitation and seasonal minimum temperature. Seasonal temperature and precipitations variables resulted as major ecological determinants for all species. Further analysis on a regional scale are needed to deeply investigate the altitudinal gradient effect.

Parole Chiave: Sub-alpine Conifers, Landscape Genetics, Population Structure, SNP Genotyping

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