

CORK OAK DISPLAYS A STRONG GENETIC STRUCTURE: A PHYLOGEOGRAPHIC STUDY USING CHLOROPLAST MARKERS

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Cork oak (*Quercus suber* L.) is an emblematic Mediterranean sclerophyllous tree, with a modern discontinuous distribution extending from the Atlantic coasts of North Africa and Iberian Peninsula to the southeastern regions of Italy, and including the main west-Mediterranean islands as well as the coastal belts of Maghreb (Algeria and Tunisia), Provence (France) and Catalonia (Spain). We have analysed by chloroplast DNA markers (microsatellites) of 110 populations throughout the distribution range. Eight microsatellite primers out of fourteen turned out to be polymorphic and led to the identification of five different haplotypes. The distribution of these haplotypes reveals a strong geographic structure, as demonstrated by the high value of genetic differentiation between populations for unordered alleles: $G_{ST} = 0.965$ (s.e. 0.0155) as well as for ordered alleles $N_{ST} = 0.962$ (s.e. 0.0180). Most populations are fixed for one haplotype. Only four populations (one per region in Spain, Morocco, Italy, and Corsica) are characterised by two different haplotypes. In the Italian peninsula and Sicily two closely related haplotypes (H1 and H2) are present. Haplotype 3 is found along the Mediterranean coast of Provence and Liguria, in the islands of Corsica, Sardinia, and Elba, as well as in the northern sector of Tunisia and Algeria. Haplotype 4 is distributed in the westernmost part of the range (southwest France, Portugal, southwest Spain and western Morocco). Haplotype 5 shows a discontinuous distribution in Catalonia, the Balearic islands and the Rif range in Morocco. Although the recent history of *Q. suber* is closely related to human activity for cork production, the geographical distribution of the cork oak haplotypes does not appear imputable to cultivation. Fossil pollen of *Q. suber* is not always reported separately from other oaks in pollen diagrams. Even with these limitations, fossil pollen and wood records suggest that in pre-Neolithic times cork oak was distributed in approximately the same areas as today. Other cultivated tree species in the Mediterranean (e.g. *Olea europaea* and *Castanea sativa*) display low geographic structure in genetic variation, arguing for a multidirectional diffusion of the cultivated taxa due to human activity. Contrary to this pattern, distinct cork oak haplotypes are found even in neighbour geographic areas such as Corsica and Italy, Tunisia and Sicily, and western and eastern Morocco, indicating that human activity did not blur the original genetic structure.