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# A biogeographical inquiry to decipher the ecological status of carob populations (*Ceratonia siliqua* L., Leguminosae) and their history prior to Mediterranean civilizations

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## Abstract

Evolutionary theory predicts that organisms with low growth rates, like trees, will be vulnerable to face rapid environmental changes. Despite its economic importance, the long-term history of carob tree is still under debate. Since De Candolle, the wildness of carob populations has been questioned on the basis of paleo-botanical, archeological and philological evidences and, unfortunately, the scarce studies on the ecology and genetic diversity of wild populations have not thrown much light on this topic. In this context, we aimed at exploring the two main hypotheses about the origin of carob populations: their possible persistence in unknown *refugia* during the Pleistocene or their putative naturalization after human dissemination throughout the Mediterranean from a single origin. Ecological marginality and geographic persistence through time were analyzed on the basis of floristic surveys and environment niche modeling respectively. Additionally, we sequenced nuclear and plastid regions from both natural and cultivated populations covering the whole current distribution of carob to explore its phylogeography based on coalescent methods. Our results point towards a past bottleneck which left two phylogroups within natural carob populations. The current potential distribution modeled for carob is extremely restrictive to the coastal areas of the Mediterranean, and its actual distribution is probably linked to strong selection pressures at the margins of its range. In the framework of the DYNAMIC project (Deciphering sYmbiotic Networks in cArob-based MedIterranean agro-eCosystems) these biogeographical insights will be used as a baseline to analyze relationships between the carob evolutionary legacy and community ecology.

**Keywords:** phylogeography, genetic diversity, refugia, pleistocene, fruit tree, marginality, climat, modelling

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