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S-65 Domestication: human-induced evolution

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 Level 3

The carob tree at the crossroad of domestication center and refugia hypotheses

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AIMS:

The Mediterranean thermophilous woodlands were early affected by human activities, mainly for forage and fruits harvest. The recurring exchanges that followed between natural ecosystems and cultivated areas have constituted a pivotal aspect in the process of Mediterranean fruit tree domestication. Determining the native status of Mediterranean fruit tree populations is a challenging task for phylogeography because early human influences began just after post glacial migrations. Here we applied phylogeographic methods and new NGS markers to tackle this issue for the carob tree (*Ceratonia siliqua* L., Leguminosae). Carob tree has been widely exploited for food and forage since antiquity and is currently used for industrial, agricultural and soil restoration purposes. The origin of carob tree populations throughout the Mediterranean basin has been associated to an historical process of dissemination by humans since its domestication in the Middle-East around 6,000-4,000 BC. However, vegetation studies stated that carob tree is a widespread component of thermophilous forest vegetation and opened a debate about the native or feral status of its populations. We used ca. 1000 genotypes based on SNPs and SSR markers to infer the main geographical genetic pools and we used multiple regression analyses based on distance matrices to assess the relative contribution to genetic differentiation of geographical distance, environment and hypotheses on past environments (past climatic suitability and human dissemination routes). In parallel, we developed new historical hypotheses from a review of *Ceratonia* fossils and species distribution modelling projected into past scenarios and we compared them to a Middle East domestication origin hypothesis. Unexpectedly, our results did not support a recent expansion from the eastern to the western Mediterranean. By contrast, a western Mediterranean refugium hypothesis prevailed, underlining the conservation importance of thermophilous forests for genetic resources of semi-domesticated tree species.