



Tropentag, September 9-11, 2020, virtual conference

“Food and nutrition security and its resilience
to global crises”

The Origin of Date Palm (*Phoenix dactylifera* L.) – State of the Art and Methods to Distinguish between Putatively Wild and Domesticated Populations

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Abstract

Date palm (*Phoenix dactylifera* L., Arecaceae) is one of the few extratropical palms and a widely recognised keystone species of arid and semi-arid ecosystems across North Africa, Cape Horn, the Middle East, and the Indus Valley. According to FAO, date palm accounts for roughly 1% of the global fruit production and is therefore an important agricultural commodity. It belongs to the few perennial and intensively domesticated species, whose wild relative(s) and putative centre(s) of domestication are not yet recognised. Hence, date palm's domestication process is considered one of the most difficult issues in agro-biodiversity contexts, but the search for its wild relative(s) has gained momentum in recent years. It is driven by (i) the need to increase the genetic pool needed for selection and adaptive management to mitigate climate change and (ii) scientific interest in the likely complex evolution of this species. In this study we review current trends in date palm research, consider climatic conditions between 130,000 BCE and today, and use archaeo-botanical (such as phytoliths and pollen) and historic (such as cave paintings and reliefs) records to unravel date palm's evolutionary process. We integrate data obtained from studies of other domesticated plants and propose approaches that allow to better predict putative regions of wild date palm. The data provide evidence for a three domestication centre theory (Persian Gulf as well as East Mediterranean and north-west African regions). The present study underlines the need for a more structured and collaborative research agenda with potential applications for other species of interest.

Keywords: Archaeology, cave painting, domestication, genetic diversity, palynology, phytoliths, private alleles