

Publication

Unique arbuscular mycorrhizal fungal communities uncovered in date palm plantations and surrounding desert habitats of Southern Arabia

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Author(s) Al-Yahya'ei, M.; Oehl, F.; Vallino, M.; Lumini, E.; Redecker, D.; Wiemken, A.; Bonfante, P.

Author(s) at UniBasel [Wiemken, Andres M.](#) ; [Al-Yahya'ei, Mohamed](#) ; [Oehl, Fritz](#) ; [Redecker, Dirk](#) ;

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The main objective of this study was to shed light on the previously unknown arbuscular mycorrhizal fungal (AMF) communities in Southern Arabia. We explored AMF communities in two date palm (*Phoenix dactylifera*) plantations and the natural vegetation of their surrounding arid habitats. The plantations were managed traditionally in an oasis and according to conventional guidelines at an experimental station. Based on spore morphotyping, the AMF communities under the date palms appeared to be quite diverse at both plantations and more similar to each other than to the communities under the ruderal plant, *Polygala erioptera*, growing at the experimental station on the dry strip between the palm trees, and to the communities uncovered under the native vegetation (*Zygophyllum hamiense*, *Salvadora persica*, *Prosopis cineraria*, inter-plant area) of adjacent undisturbed arid habitat. AMF spore abundance and species richness were higher under date palms than under the ruderal and native plants. Sampling in a remote sand dune area under *Heliotropium kotschyi* yielded only two AMF morphospecies and only after trap culturing. Overall, 25 AMF morphospecies were detected encompassing all study habitats. Eighteen belonged to the genus *Glomus* including four undescribed species. *Glomus sinuosum*, a species typically found in undisturbed habitats, was the most frequently occurring morphospecies under the date palms. Using molecular tools, it was also found as a phylogenetic taxon associated with date palm roots. These roots were associated with nine phylogenetic taxa, among them eight from *Glomus* group A, but the majority could not be assigned to known morphospecies or to environmental sequences in public databases. Some phylogenetic taxa seemed to be site specific. Despite the use of group-specific primers and efficient trapping systems with a bait plant consortium, surprisingly, two of the globally most frequently found species, *Glomus intraradices* and *Glomus mosseae*, were not detected neither as phylogenetic taxa in the date palm roots nor as spores under the date palms, the intermediate ruderal plant, or the surrounding natural vegetation. The results highlight the uniqueness of AMF communities inhabiting these diverse habitats exposed to the harsh climatic conditions of Southern Arabia.

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