

Chemotrophic Signal Exchange between the Host Plant *Helianthemum sessiliflorum* and *Terfezia boudieri*

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Abstract : The ectomycorrhizal (ECM) desert truffle *Terfezia boudieri* produces edible fruit bodies and forms symbiosis with its host plant *Helianthemum sessiliflorum* (Cistaceae) in the Negev desert of Israel. The symbiosis is vital for both partners' survival under desert conditions. Under desert habitat conditions, ECMs must form symbiosis before entering the dry season. To secure a successful encounter, in the course of evolution, both partners have responded by evolving special signals exchange that facilitates recognition. Members of the Cistaceae family serve as host plants for many important truffles. Conceivably, during evolution a common molecule present in Cistaceae plants was recruited to facilitate successful encounter with ectomycorrhizas. Arbuscular vesicular fungi (AM) are promiscuous in host preferences, in contrast, ECM fungi show specificity to host plants. Accordingly, we hypothesize that *H. sessiliflorum* secretes a chemotrophic-signaling, which is common to plants hosting ECM fungi belonging to the Pezizales. However, thus far no signaling molecules have been identified in ECM fungi. We developed a bioassay for chemotrophic activity. Fractionation of root exudates revealed a substance with chemotrophic activity and molecular mass of 534. Following the above concept, screening the transcriptome of *Terfezia*, grown under chemoattraction, discovered genes showing high homology to G proteins-coupled receptors of plant pathogens involved in positive chemotaxis and chemotaxis suppression. This study aimed to identify the active molecule using analytical methods (LC-MS, NMR etc.). This should contribute to our understanding of how ECM fungi communicate with their hosts in the rhizosphere. In line with the ability of *Terfezia* to form also endomycorrhizal symbiosis like AM fungi, analysis of the mechanisms may likewise be applicable to AM fungi. Developing methods to manipulate fungal growth by the chemoattractant can open new ways to improve inoculation of plants.

Keywords : chemotrophic signal, *Helianthemum sessiliflorum*, *Terfezia boudieri*, ECM

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