

## Publication

The H<sup>+</sup>-ATPase HA1 of *Medicago truncatula* Is Essential for Phosphate Transport and Plant Growth during Arbuscular Mycorrhizal Symbiosis**JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)****ID** 2683632**Author(s)** Krajinski, Franziska; Courty, Pierre-Emmanuel; Sieh, Daniela; Franken, Philipp; Zhang, Hao-qiang; Bucher, Marcel; Gerlach, Nina; Kryvoruchko, Igor; Zoeller, Daniela; Udvardi, Michael; Hause, Bettina**Author(s) at UniBasel** [Boller, Thomas](#) ; [Courty, Pierre-Emmanuel](#) ;**Year** 2014**Title** The H<sup>+</sup>-ATPase HA1 of *Medicago truncatula* Is Essential for Phosphate Transport and Plant Growth during Arbuscular Mycorrhizal Symbiosis**Journal** The plant cell**Volume** 26**Number** 4**Pages / Article-Number** 1808-1817

A key feature of arbuscular mycorrhizal symbiosis is improved phosphorus nutrition of the host plant via the mycorrhizal pathway, i.e., the fungal uptake of Pi from the soil and its release from arbuscules within root cells. Efficient transport of Pi from the fungus to plant cells is thought to require a proton gradient across the periarbuscular membrane (PAM) that separates fungal arbuscules from the host cell cytoplasm. Previous studies showed that the H<sup>+</sup>-ATPase gene HA1 is expressed specifically in arbuscule containing root cells of *Medicago truncatula*. We isolated a ha1-2 mutant of *M. truncatula* and found it to be impaired in the development of arbuscules but not in root colonization by *Rhizophagus irregularis* hyphae. Artificial microRNA silencing of HA1 recapitulated this phenotype, resulting in small and truncated arbuscules. Unlike the wild type, the ha1-2 mutant failed to show a positive growth response to mycorrhizal colonization under Pi-limiting conditions. Uptake experiments confirmed that ha1-2 mutants are unable to take up phosphate via the mycorrhizal pathway. Increased pH in the apoplast of abnormal arbuscule containing cells of the ha1-2 mutant compared with the wild type suggests that HA1 is crucial for building a proton gradient across the PAM and therefore is indispensable for the transfer of Pi from the fungus to the plant.

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