

Role of lipid biosynthesis and putative lipid transporters in AM symbiosis

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Most land plants live in an association with a distinct group of soil fungi known as arbuscular mycorrhiza (AM) fungi. In this mutualistic symbiosis, the plant host receives mineral nutrients from the fungus, in return the fungus receives carbon derived from photosynthesis. The exchange of nutrients involves a complex symbiotic interface between the membrane of branched fungal structures, the arbuscules, and the surrounding host membrane, the peri-arbuscular membrane. Until recently, the carbon delivered to AM fungi was thought to consist exclusively of carbohydrates. However, recent studies have shown that AMF lack essential genes for *de novo* fatty acid (FA) synthesis suggesting an external supply of lipids. Indeed, recent evidence showed that AM fungi may receive lipids from plants, but the mechanisms involved in the delivery of lipids to the fungus remain unknown. The ABCG half-size transporters *STR* and *STR2* are known to be indispensable for arbuscular mycorrhizal symbiosis in *Medicago truncatula* and *Oryza sativa*, and they may have a role in lipid transfer. In this study on AM in petunia, I compared the phenotype of *str* and the duplicated *str2a* and *str2b* and I isolated a double mutant *str2a, str2b* for phenotypic analysis. *STR* and *STR2* could function as lipid transporter from the host to the fungus. I also investigated the expression of lipid-related genes during AM symbiosis and the effect of phosphate on these genes. I show that *STR2A* and *STR2B* act redundantly, and that their function is essential for arbuscule development. Finally, my studies show that several lipid-related genes are induced in mycorrhizal *Petunia hybrida*.

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