

Galactolipid Synthesis and Transport in *Arabidopsis thaliana* and *Lotus japonicus*

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The two galactolipids MGDG and DGDG (mono- and digalactosyldiacylglycerol) are synthesized in the envelope membranes of chloroplasts. Complementation experiments with glycosyltransferase genes from *Arabidopsis* and the photosynthetic bacterium *Chloroflexus* revealed that DGDG has to be transported from the outer to the inner envelope as a prerequisite for final accumulation in thylakoid membranes. Under specific growth conditions, i.e. phosphate deprivation or nodulation in legumes, DGDG is exported to extraplastidial membranes including the plasma membrane and the symbiosome membrane surrounding rhizobial bacteria in nodulated legume root cells. Down-regulation of DGDG production in *Lotus* roots results in a strong nodulation phenotype. In transgenic *Lotus* roots, the generation of infection threads, nodule primordia and nodules is strongly reduced. Deficiency in nodulation is linked to growth on phosphate-deficient medium. After phosphate re-supply, transgenic *Lotus* plants with reduced DGDG amount develop nodules very similar to WT. Therefore, the galactolipid DGDG is crucial for membrane assembly during the formation of the infection thread and symbiosome membrane.