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MEDICAGO TRUNCATULA ROOTS OVEREXPRESSING THE NSLTP N5 DISPLAY MODIFICATIONS IN THE LIPID PROFILE AND CHANGES IN THE EXPRESSION OF GENES INVOLVED IN LIPID METABOLISM AFTER *SINORHIZOBIUM MELILOTI* INFECTION

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Lipid-transfer proteins (LTPs) are small basic proteins present in higher plants that are characterized by the capacity to bind and transfer lipids between membranes *in vitro*. LTPs are thought to participate in membrane biogenesis and regulation of the intracellular fatty acid pools. However, due to the presence in all the identified plant LTPs of a N-terminal signal peptide for the targeting to the secretory pathway, other biological roles have been proposed such as participation in cutin formation, embryogenesis, defense against pathogens. Recently, two LTPs have been demonstrated to be implicated in the symbiosis between leguminous plants and nitrogen-fixing bacteria. In Chinese milk vetch, a winter growing green manure legume, that can establish a symbiosis with *Mesorhizobium huakuii*, the LTP AsE246 participates in the transport of plant-synthesised lipids to the symbiosome membrane and is essential for nodule organogenesis (Lei et al. 2014). In the symbiotic interaction between *M. truncatula* and *Sinorhizobum meliloti*, a nsLTP, the Nodulin 5 (N5) is required for nodulation since its suppression in roots resulted in a reduced number of invaded primordia and nodules (Pii et al. 2009; Pii et al. 2012). Based on these results and on the MtN5 capacity to bind lipids *in vitro,* it has been supposed that N5 either is involved in the remodeling of membranes during rhizobial infection or participates in the signaling between rhizobia and host cells (Pii et al. 2013). To shed light on the of MtN5 during early symbiotic events, we investigated the metabolic pathways for lipid production associated with the MtN5overespression. We carried out a comparative transcriptomic analysis of MtN5overexpressing (MtN5ox) and wild type roots after 72h of *Sinorhizobium meliloti* inoculation; in the same experimental conditions, we assayed the effects of MtN5 overexpression on the root lipid profile. In MtN5ox roots, we identified a quite relevant number of differential expressed genes involved in lipid transport and metabolism. The major changes were detected in genes implicated in phopholipid signalling pathways such as myo-inositol 1-phosphate synthases, phosphatidylinositol-specific phospholipase, phosphatidylinositol kinases, phosphatidylinositol transfer protein, inositol mono-phosphatase. All these transcripts were down-regulated in inoculated MtN5ox roots. Interestingly we demonstrated that MtN5 functioning is dependent on phospholipase D but not on phospholipase C activity (Pii et al., 2012). The analysis of the root lipid fraction revealed that MtN5 overexpressing roots displayed a general increase in the lipid content, that was especially relevant for galactolipids that are component of plastid and symbiosome membranes.