Evaluation of interactions between arabidopsides and plant plasma membrane lipids

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Introduction
Plant oxylinps produced by the oxidation of unsaturated fatty acids play important roles in plant metabolism and protection against pathogens. Recently, it has been discovered that Arabidopsis thaliana L. produces high quantities of oxylinps esterified to galactolipids under stress. Those molecules are called arabidopsides and are produced following oxidation of monogalactosyl-diacylglycerol and digalactosyl-diacylglycerol found in high quantities in thylakoid membranes. Moreover, arabidopsides pattern is different depending on the nature of the stress, suggesting an involvement of those molecules in plant protection responses. However, the mechanisms of biological activities of arabidopsides remain largely unknown.

Objectives
Following stress, arabidopsides could be released and interact with plant plasma membranes. In the present work, arabidopsides ability to interact with plant plasma membrane lipids was evaluated by molecular modelling methods.

Determination of arabidopside 3D structures
Structure tree is an informatic tool that calculates biomolecules lowest energy structure(s) based on its major torsion axis.

Arabidopsides affinities with plant plasma membrane lipids
The docking method Hypermatrix allow to calculate the interaction between lipids and a biomolecule positioned at an hydrophobic/hydrophilic interface. Interaction energies are calculated and more stables positions for each lipid are determined. This method allow to predict if interactions between different molecules is favorable.

Arabidopsides abilities to insert within a membrane
The method Impala allow to simulate biomolecules insertion in an implicit membrane.

Conclusion
Results suggest that the interaction between arabidopsides and some plant plasma membrane lipids, such as GIPC, is favorable. Arabidopsides could also be able to get inserted within plant plasma membranes. Consequently, arabidopsides could modify plant plasma membrane organization and such change could be a signal for defense mechanisms activation. As a perspective, in-vitro studies will be performed in order to study interactions between arabidopsides and models of membranes.

Literature
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