Title: Target metabolomics approaches to study plant responses to abiotic stress

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Abstract: Reversed phase (RP) chromatography is an established approach in mass spectrometry–based metabolomics. However, many primary metabolites, in particular carbohydrates, are highly polar compounds, and show minimal retention on typical RP stationary phases therefore eluting very close to the void volume without chromatographic separation. Normal phase separations have traditionally suffered from poor reproducibility and separation efficiencies and tend to use eluents that are not readily compatible with mass spectrometry. We have previously developed robust alternative online LC-ESI-MS/MS methods using:

(i) Porous graphitic carbon (PGC) stationary phases for the simultaneous targeted analysis of several intermediates of the glycolytic metabolic pathway from A. thaliana leaf material [1], and to detect small alterations in carbohydrate levels under drought stress conditions in the stems of Lupinus albus [2] and in the leaves of the resurrection plant Haberlea rhodopensis [3].

(ii) Hydrophilic interaction liquid chromatography (HILIC) stationary phases for the simultaneous targeted analysis of neutral and charged plant primary metabolites [4].

The project consists in using several metabolomics methodologies, from sample preparation for metabolomics analyses to the extraction of primary metabolites and LC-MS/MS target analysis to simultaneously separate and identify key stress-responsive metabolites (osmolytes) that accumulate in plants under abiotic stress conditions [6].

References:


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