A. thaliana phosphooxylipins's: linking lipid signalling to biotic defence

Development of an analytical method to detect phosphooxylipins by UHPLC–MS/MS (ESI-)

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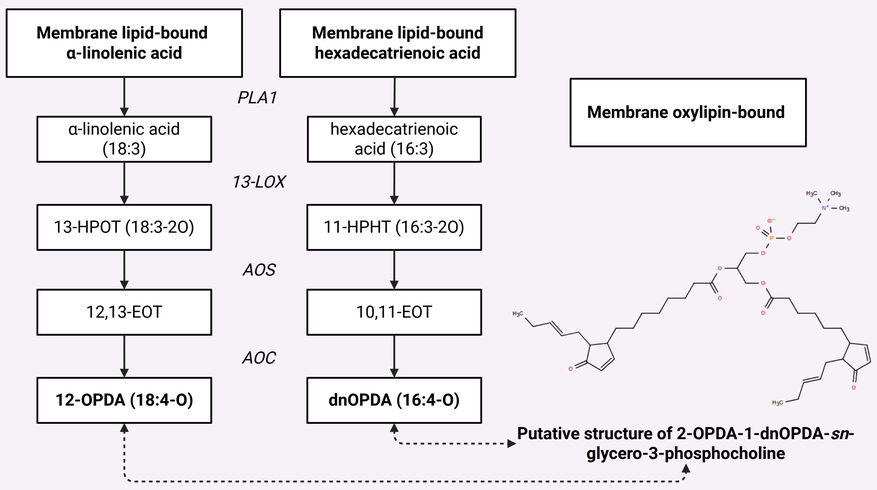
INTRODUCTION

Oxylipins are oxidized lipids derived from polyunsaturated fatty acids. They accumulate during stress and can be stored in esterified forms in membrane lipids. Jasmonates—including OPDA, dn-OPDA and jasmonic acid (JA)—are key oxylipin signals regulating plant defence responses.



12-oxo-phytodienoic acid (OPDA) and dinor-OPDA (dnOPDA) biosynthetic pathway — *PLA1: Phospholipase A1, 13-LOX: 13-Lipoxygenase, AOS: Allene Oxide Synthase, AOC: Allene Oxide Cyclase*

OBJECTIVES

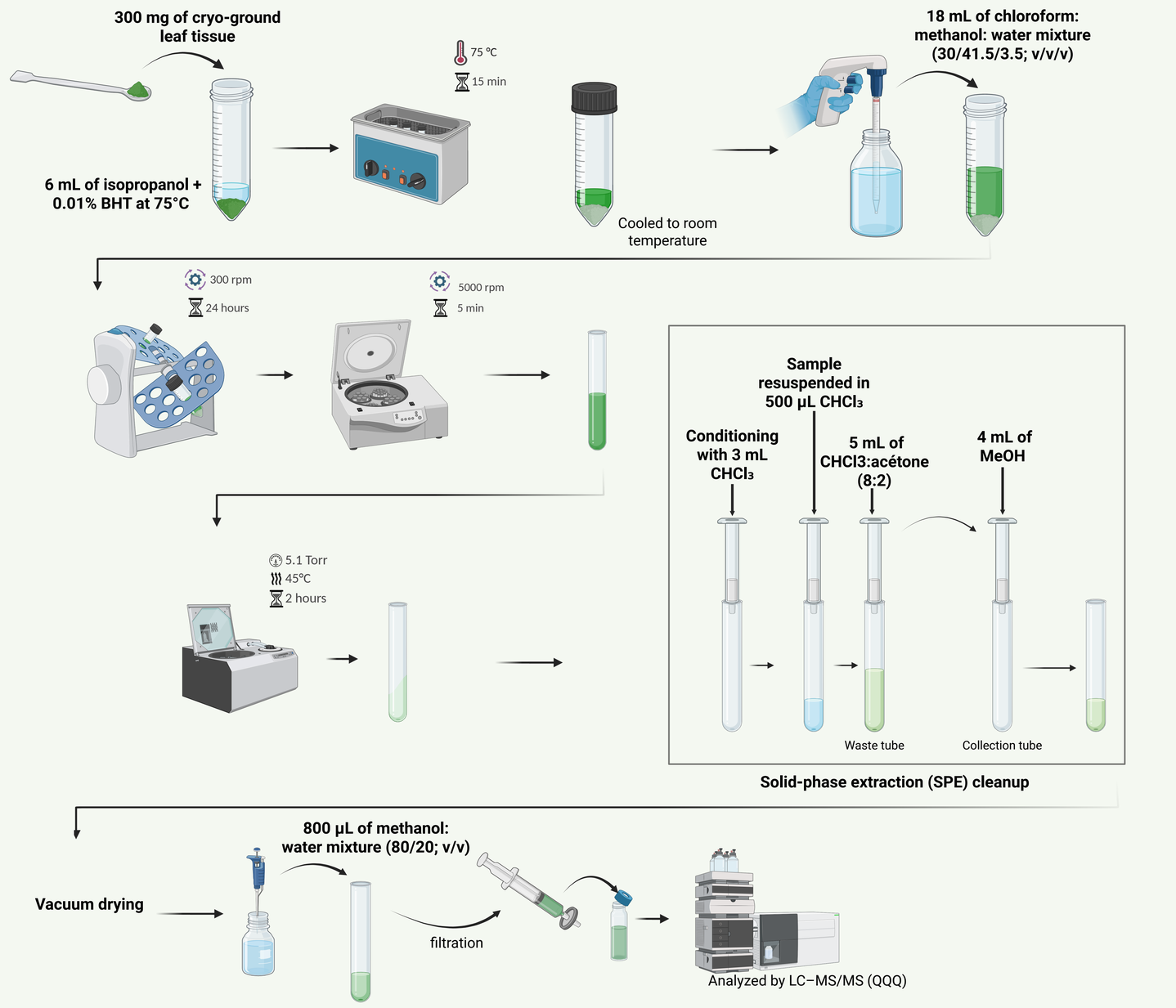
The first part of this work focuses on developing a method to detect and separate **phosphooxylipins** (POLs) in *Arabidopsis thaliana* under stress.

MATERIAL AND METHODS

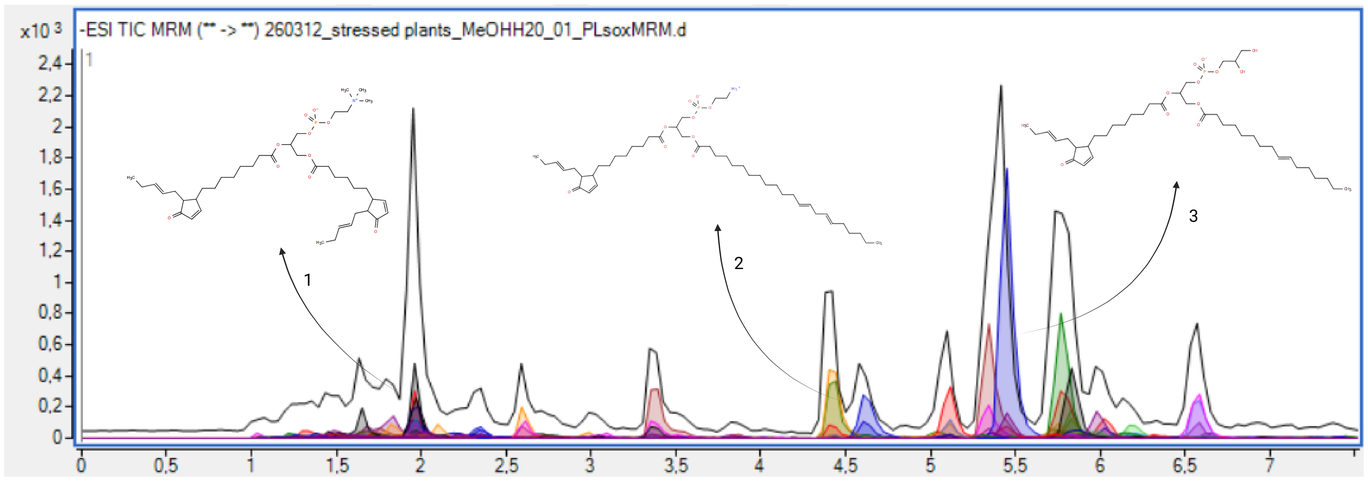
1. Plant treatment

- Freeze–thaw treatment
- Mechanical wounding by leaf crushing

2. Lipid extraction and sample preparation



RESULTS



MRM Analysis of POLs by LC-MS/MS in freeze-thawed plants by LC MS/MS (ESI-) — *1: Putative structure of PC 34:8-2O (2-OPDA-1-dnOPDA-sn-glycero-3-phosphocholine), 2: Putative structure of PE 40:6-O (2-OPDA-1-docosadienoyl-sn-glycero-3-phosphoethanolamine), 3: Putative structure of PG 34:5-O (2-OPDA-1-palmitoleoyl-sn-glycero-3-phosphoglycerol)*

CONCLUSION

This first analytical method enables the detection of putative phosphooxylipins in *Arabidopsis thaliana*, likely including OPDA-containing species. These preliminary identifications are supported by MS data and should be further confirmed by fatty acid hydrolysis followed by GC–MS analysis, in order to validate the lipid-derived nature of the detected compounds.

PERSPECTIVES

- **Extension to classical phospholipids** (PC, PE, PG, PI, PS) and oxidized species
- **Optimization of MS/MS and ESI source parameters** using standards
- Optimization of SPE cleanup conditions to enhance selectivity
- Improvement of lipid extraction protocols
- Full **analytical validation** (LOD, LOQ, linearity, accuracy, precision)
- Application to **additional biotic stress** conditions in *Arabidopsis thaliana*

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