Study of the role of complex lipids in plant responses to stress

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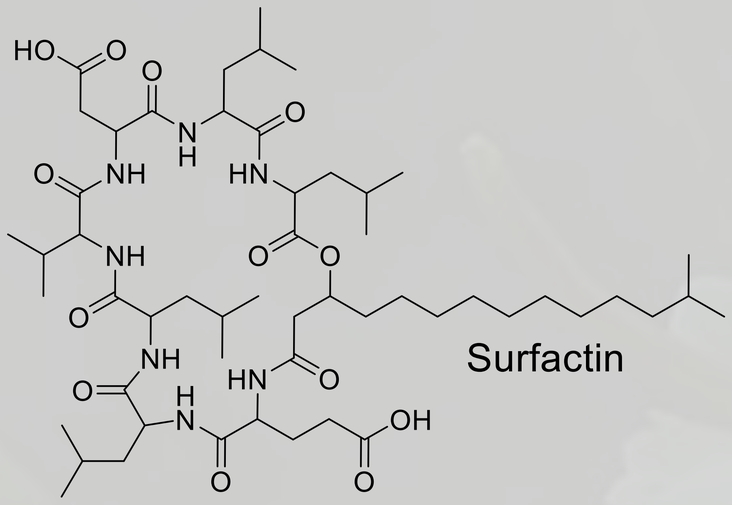
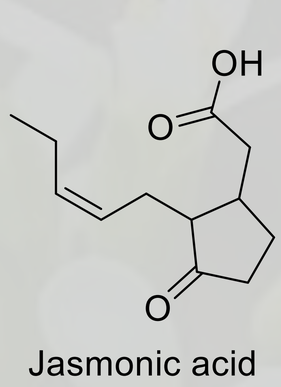
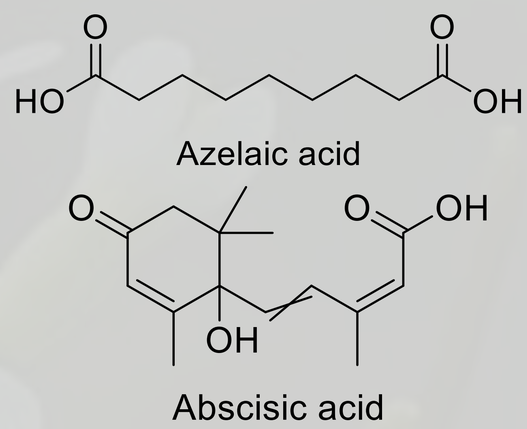
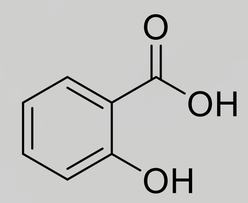
Context

Plants are subjected to various biotic and abiotic stresses during their development, including wounding, pathogen attack, insects, viruses, temperature variations, drought, and many others. Among the plant responses to these stresses, the production of phytohormones, reactive oxygen species and cytosolic calcium are notably induced. Phytohormones in particular play a regulatory role in plant development, reproduction and death.







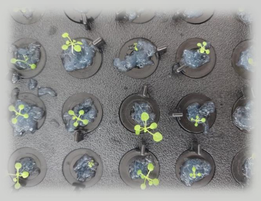


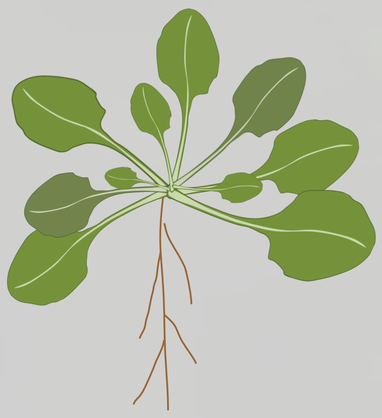
Nevertheless, plants are able to resist certain external attacks more effectively through interactions with non-pathogenic micro-organisms such as plant growth-promoting rhizobacteria (PGPR) i.e, the *Bacillus* genus. This is called microbial priming, which is part of the plant induced systemic resistance.

Among the secondary metabolites produced by these non-pathogenic microorganisms, *Bacillus* lipopeptides, and more precisely surfactins, are well known to be microbial elicitors that enable priming in plants.

Methods

0 Cultivation of wild type *A. thaliana* in hydroponics conditions

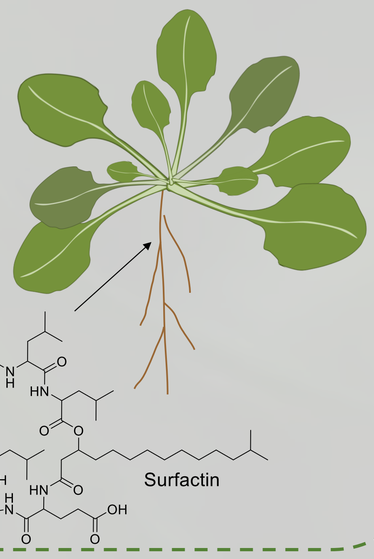




1 Priming induction

Addition of surfactin in the nutrient solution

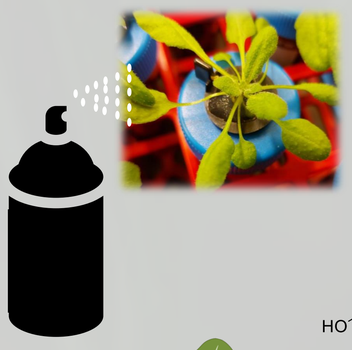
Solution of surfactin →

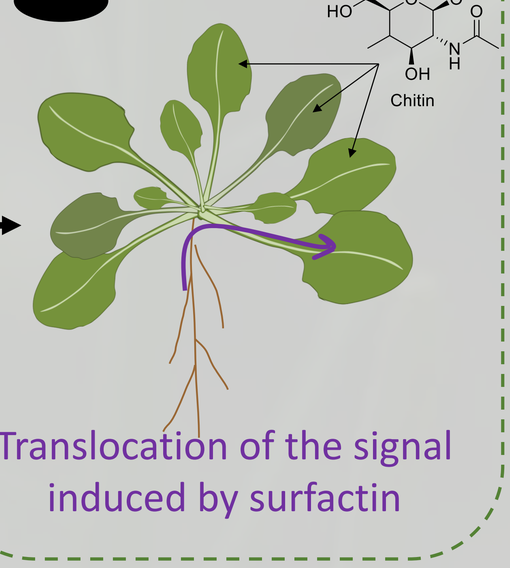


2 Stress induction

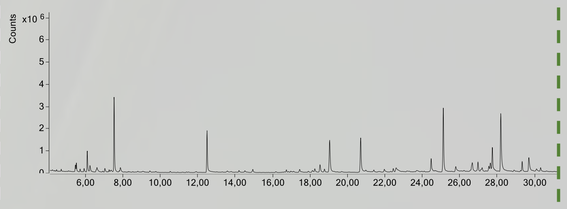
Spraying chitin on leaves

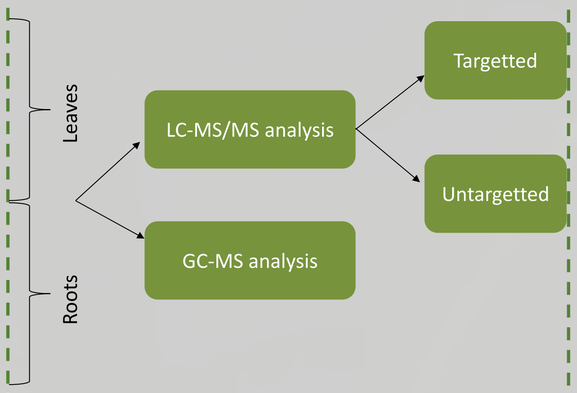
Chitin is used to mimic a fungal attack





3 Analysis by GC-MS and LC-MS





Conclusion and perspectives

The present study aims to understand how surfactin modifies the metabolome of root tissue and to identify and characterize the molecules that are translocated from roots to leaves. In addition, the immune response set up in leaves of plants that have been primed and then attacked by a pathogen will be explored. Two LC-MS/MS approaches will be combined to answer these aims: a targeted analysis of phytohormones and a non-targeted analysis. In addition to liquid chromatography analyses, particular attention will also be paid to volatile organic compounds emitted by the plant, and that will be analyzed by GC-MS. These two techniques will enable to characterize changes in the metabolome of leaves and roots following surfactin priming in *A. thaliana*.

References

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