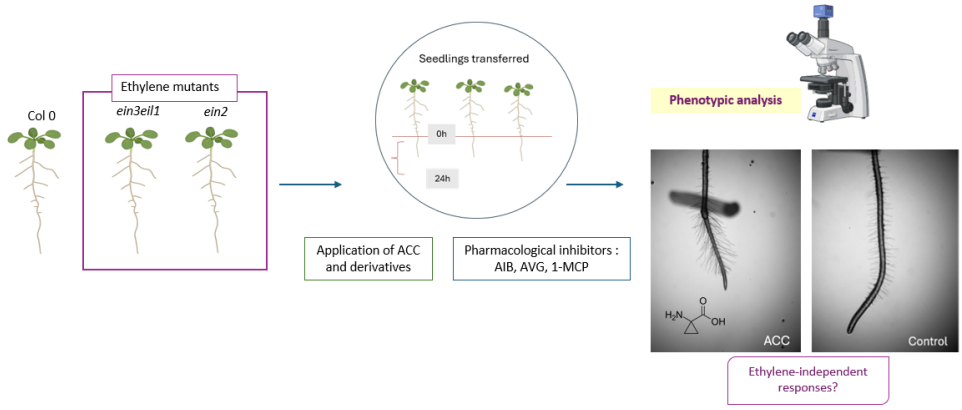
EXPLORING ETHYLENE-DEPENDENT AND ETHYLENE-INDEPENDENT RESPONSES TO ACC AND ITS DERIVATIVES IN ARABIDOPSIS



Plant growth and development are regulated by phytohormones, which help plants adapt to changing environmental conditions. Ethylene plays an important role in these processes, particularly in stress responses and root development. Its direct precursor, 1-aminocyclopropane-1-carboxylic acid (ACC), has traditionally been considered an intermediate in ethylene biosynthesis. However, increasing evidence suggests that ACC might also act independently of ethylene. Furthermore, ACC can be converted into several derivatives, whose biological functions remain poorly understood.

During your thesis, you will investigate how ACC and its derivatives affect root development in Arabidopsis thaliana. By combining ethylene signalling mutants (ein2, ein3eil1) with pharmacological inhibitors (AVG, AIB and 1-MCP), we aim to explore to what extend these responses depend on ethylene biosynthesis and signalling.

The project will combine in vitro plant cultivation, genetic and pharmacological approaches, and root phenotyping. You will study the effects of ACC and its derivatives on root elongation and root hair development, gaining experience in microscopy, image analysis and plant physiology. You will receive continuous mentoring and actively contribute to ongoing research.

Combined, your results will contribute to a better understanding of how ACC and its derivatives regulate plant development, helping to understand better the complex relationship between ACC metabolism, ethylene signalling and plant growth.

Methods:

- In vitro cultivation of Arabidopsis thaliana
- Pharmacological inhibition of ethylene biosynthesis and perception
- Root growth and root hair phenotyping using microscopy and image analysis

References:

Vanderstraeten L, Depaepe T, Bertrand S, Van Der Straeten D. (2019). The Ethylene Precursor ACC Affects Early Vegetative Development Independently of Ethylene Signaling. Frontiers in Plant Science, 10:1591. https://doi.org/10.3389/fpls.2019.01591

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