

Title: Chilling stress responses in the Maize Leaf Growth Zone

Supervisor:

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Description of project:

Chilling stress, temperatures between 0 and 15°C, negatively affects maize (*Zea mays*) yield in North-Western Europe. In contrast to the direct response to cold, the recovery from chilling stress has hardly been studied. I aim to address this lack of knowledge by performing an integrated study of chilling recovery in the maize leaf growth zone.

The objective of this project is (1) Determine cold sensibility performance of 30 contrasting maize lines for cold tolerance using a Leaf Length Tracker to quantify growth recovery at high temporal resolution. (2) Study differences in recovery by kinematic analysis to quantify of cell division and expansion rates (3) Perform series of biochemical, physiological, and molecular assays for the three leaf zones (Division, Expansion and Maturation Zone) to understand better the mechanisms of cold recovery and tolerance in contrasting maize lines.

Techniques to be used

- Leaf growth analysis: by using the Leaf Length tracker
- Kinematics analysis: by measuring cell length, meristem length, and leaf length
- Biochemical analysis: by measuring pigments, sugars, antioxidants, markers of oxidative stress (MDA, Electrolyte leakage) along the maize leaf (Division, Expansion and Maturation zone)
- Molecular analysis using RNA-sequencing: From RNA extraction to over-representation of differentially expressed genes and selection of candidate genes associated with cold recovery