PROJECT: CYRO

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PROJECT TITLE

Crop Yield and Resilience Optimization: Physiological and Phenotypic Responses to differential SnRK1 localisation.

CONSORTIUM

P 1	Prof. Andreas S. Richter		
P 2	Helen Landgraf		
P 3	Kathrin Jahnke		

SUMMARY OF THE REPORT

Sugars provide energy and are the basis of all life. They are an essential component of bioeconomic value chains and product generation. Plants can fix atmospheric carbon dioxide through photosynthesis and convert it into energy-rich carbohydrates. Crop production and yields depend directly on photosynthetic energy and sugar accumulation. Based on our fundamental research, we have identified an approach to improve sugar and biomass yields and crop stress resilience. A vital role in this process is played by an evolutionarily conserved protein kinase, Sucrose Non-fermenting related Kinase 1 (SnRK1). Our preliminary work shows that the differential localization of the protein kinase in the model plant *Arabidopsis thaliana* affected the carbon-nitrogen balance, resulting in low amino acid but high sucrose contents in conjunction with an increase in biomass. These positive effects on growth have enormous potential to enhance the bioeconomic value of crops. The DPPN-Access project aimed to illuminate the physiological consequences of differential SnRK1 localisation on growth and stress resilience within the framework of fundamental research. To this end, several hundred plants of each genotype expressing SnRK1 versions that preferentially accumulate in different cellular compartments were exposed to control, drought, and heat stress treatments and further analysed following a period of recovery. During the experiment, shoot growth was assessed using automated RGB imaging, and samples for transcript and metabolite analyses were harvested. Pursuing the DPPN-Access project was crucial for successfully analysing the effect of differential SnRK1 localization on abiotic stress tolerance in the model plant and for assessing the potential to translate the approach to crops such as sugar beets, potatoes, or cereals.