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Poster Communication Abstract – PH.40

THE MOLECULAR MECHANISM INTEGRATING HYPOXIA SIGNALING WITH SUGAR AVAILABILITY

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abiotic stress, hypoxia, sugar availability

During flooding plants are exposed to low oxygen stress. Hypoxia activates expression of several genes, including those encoding for fermentation enzymes. As ATP production via the mitochondrial electron transport chain requires oxygen, plants activate ethanol and lactic fermentation to sustain glycolysis to provide a basal level of cellular energy. This requires the input of sugars and therefore carbon availability is crucial for survival in low oxygen conditions. However, the strength of the anaerobic response requires fine-tuning so it does not deplete the carbohydrates reserves of the plant before flooding recedes. This hypothesis is supported by the observation that plants subjected to sugar starvation under low oxygen conditions show a reduced expression of hypoxia responsive gene ALCOHOL DEHYDROGENASE (ADH). However, the molecular mechanism that integrates sugar reserves and anaerobic response remains elusive. Previously, we showed that the repression of the anaerobic response due to sugar starvation is downstream of the hypoxic stabilization of the ethylene responsive factor VII (ERF-VII) proteins. Interestingly, the analysis of a hypoxia-inducible pPCO1:GUS reporter line revealed that the response dampening take place at the gene expression level. Taken together, these data indicate that the fine-tuning of anaerobic response occurs upstream of interaction of ERF-VII transcription factors with hypoxia responsive genes promoters. In this context we aim to understand the regulation of transcriptional activity of ERF-VII proteins during sugar starvation in Arabidopsis thaliana. Remarkably, we identified two phosphorylation sites in RAP2.12 which are involved in the dampening of anaerobic response upon carbohydrate starvation, providing a starting point to unravel the molecular mechanism.