The Circadian Clock of Sugarcane Influences Auxin Transcriptional Responses

Chaves, GAT1; Lima, CA1; Hotta, CT1.
1Biochemistry Department, Institute of Chemistry, University of São Paulo

INTRODUCTION/The circadian clock allows organisms to anticipate daily and seasonal changes in the environment, with great impact to the productivity of plants. We have previously shown that the sugarcane circadian clock generates biological rhythms of transcription with a period of 24 h, including many transcripts associated to auxin signaling. These transcripts could be separated in two different groups, based on the time of their peak. **OBJECTIVES/**The aim of this work is to evaluate the circadian clock modulation of transcriptional responses to exogenous auxin application in sugarcane plantlets *in vitro*. **MATERIAL AND METHODS/**Sugarcane plantlets generated in large scale were obtained through an indirect organogenesis protocol. Transcriptional responses of sugarcane plantlets leaves after 1h of 80 μM NAA spraying were evaluated using RT-qPCR and oligoarrays. **RESULTS AND DISCUSSION/**Five auxin-related genes with significant and reproducible responses to 80 μM NAA were identified. Some of these genes showed different responses in different time points when plants were more than 24 h under constant light and temperature. For example, a gene coding for an auxin conjugating protein had a response 2.2 higher at ZT18 than ZT24. A microarray experiment was made for sugarcane plantlets sprayed with 80 μM NAA in six different time points after plants were 24h under constant environmental conditions. A total of 281 differentialy expressed genes were identified, with the greatest number of differentialy expressed genes in the ZT16. It was possible to identify genes with different differential transcriptional responses in different timepoints, what suggests modulation of auxin responses by the sugarcane circadian clock. **CONCLUSION/**We developed an assay which will allow us to investigate the mechanisms by which the circadian clock gates auxin signaling, improving both our knowledge about circadian clock mechanisms and auxin signaling in sugarcane.

Key Words: sugarcane, auxin, circadian clock, RTqPCR, oligoarrays

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