5th BCNP Brazilian Conference on Natural Products
XXXI RESEM
Atibaia – SP – Brazil
ISBN: 978-85-66836-10-3
Oct. 26–29th 2015

METABOLISM OF SUGARCANE LEAVES IN DIFFERENT DEVELOPMENT STAGES: INVESTIGATING THE PROCESS OF SUCROSE ACCUMULATION

Fernando Cotinguiba [1,2], Ilara Budzinski [2], Fabrício Edgar de Moraes [2], Thaís Regiani [2], Carlos Alberto Labate [2]

[1] IPPN, CCS, Universidade Federal do Rio de Janeiro (UFRJ), Rio de Janeiro, Brazil;
[2] ESALQ, Universidade de São Paulo (USP), Piracicaba, Brazil; fernando@nppn.ufrj.br

Abstract: Many physiological processes influence the sucrose accumulation in the sugarcane stem and these processes are still not well known, but it is known that sucrose is produced in leaves, translocated in the phloem and stored in the stems [1]. Our research project aims to establish an overview of the molecular factors that control the accumulation of sucrose in sugarcane using metabolomics tools. Changes in the metabolome in leaves, at different stages of development, were monitored with particular interest in the accumulation of sucrose. Plants were grown in the field between May 2012 and June 2013, leaves (+1) were collected at 3, 7, 10 and 12 months old. The metabolites were extracted from 50 mg of powder tissue, according to Gullberg et al. [2] with minor modifications. Samples were analyzed by GCxGC-TOF-MS (Pegasus 4D, Leco, St. Joseph). The raw data were processed using the LECO software ChromaTOF Version 4:44 and the TargetSarch package [3], the compounds were identified using the GMD library. The data were normalized by TIC, log transformed and scaled using Pareto. Multivariate analyzes (PCA and PLS-DA) were performed and the differentially abundant metabolites were identified by the variable importance in the projection (VIP) based on PLS-DA. These analysis were done in the MetaboAnalyst 3.0 web-server [4]. By PLS-DA we discriminate treatments ($Q_2 \geq 0.8$) and we observed leaf metabolite changes in response to plant growing. Based on VIP (>1) we identified 27 metabolites differentially abundante in the leaves. Among these metabolites we found organic acids (tropic acid, 2,5-dimethoxy cinnamic acid, palmitic acid, maleic acid), sugars (melibiose, fructose, galactose), aminoacids (L-lysine) and others. At this moment, we are searching for the biological function of each metabolite, to identify the factors that may suggest the involvement of them in the process related to sucrose accumulation. Our results provide a first view into sugarcane leaves metabolites during growing.

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