

METABOLOMICS AND PROTEOMICS OF SUCROSE ACCUMULATION IN SUGARCANE

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FAPESP Process 2008/56100-5 | Term: Nov 2010 to Oct 2014 | Thematic Project

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1. Characterization of the metabolome and proteome of leaves, internodes (juvenile and mature), at different stages of development. The sugarcane cultivar analysed was SP80-3280.
 - 1.1 Characterization of the proteome of juvenile and mature internodes during sucrose accumulation at different stages of sugarcane development.
 - 1.2 Cell wall proteomics of cells and young leaves and internodes from sugarcane.
 - 1.3 Development of the methodology for isolation of intact nucleus from young sugarcane leaves for its proteomic characterization.
 - 1.4 Continuation of the above project aiming to identify differences in the nucleus proteome of sugarcane plants exposed to water stress. The experiments were conducted in greenhouse conditions and following the water stress treatment, plants were left to recover, in order to identify proteins linked to recovery process.
 - 1.5 Proteomics and metabolomics of sugarcane under water stress using the cultivar SP 80-3280 under field conditions
 - 1.6 The second project on proteomics and metabolomics of sugarcane analysed the responses of two varieties of sugarcane, tolerant and susceptible, to water stress.

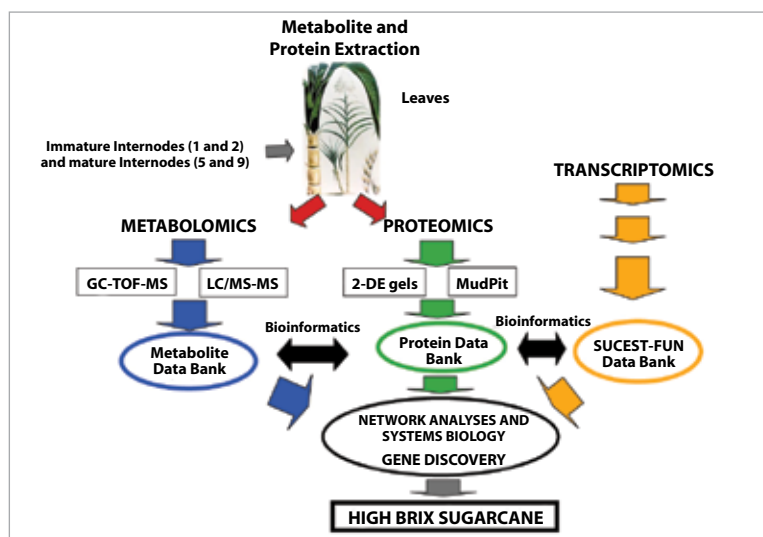


Figure 1. Experimental flow showing the main activities to be developed in the project

- 1.7 Field experiments (UFSCAR) in collaboration with the group of Prof. Glauca Mendes Souza (*Sugarcane Signaling and Regulatory Networks* – Thematic project FAPESP 2008/52146-0). The aim of this project is to establish the metabolic profile of plants from the cultivar SP 80-3280, under field conditions.
- 1.8 Lipidomics of leaves of sugarcane using the technique of Maldi Imaging (IMS). This project is being developed in order to understand the lipid composition of sugarcane leaves.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

The thematic project was important to establish several lines of research in our laboratory, such as proteomics and metabolomics of sugarcane. We were able to establish the techniques of quantitative proteomics and metabolomics. Besides, we had the possibility of training several undergraduate and graduate students (MS and PhD) as well as post-docs. We established a good scientific collaboration with Prof. Elizabeth Jamet from the University Paul Sabatier, of Toulouse-France, with whom we published the first article on cell wall proteomics of cell culture of sugarcane. Presently, we have submitted the second manuscript of cell wall proteomics of sugarcane leaves to *BMC Plant Biology*.

Certainly, the project is being continue with research lines started and in the following years we will be publishing more articles related to these topics.

MAIN PUBLICATIONS

Silva RR, Jourdan F, Salvanha DM, Letisse F, Jamin EL, Guidetti-Gonzalez S, Labate CA, Vêncio RZN. 2014. ProbMetab: an R package for Bayesian probabilistic annotation of LC-MS based metabolomics. *Bioinformatics*. **February 3**: 1-2.

Calderan-Rodrigues MJ, Jamet E, Bonassi MBC-R, Guidetti-Gonzalez S, Begossi AC, Setem LV, Franceschini LM, Fonseca JG, Labate CA. 2014. Cell wall proteomics of sugarcane cell suspension cultures. *Proteomics*. **14**: 738-749.

Submitted:

Calderan-Rodrigues, MJ, Jamet E, Douché T, Bonassi MBR, Cataldi TR, Guimarães JF, San Clemente H, Pont-Lezica R, Labate CA. 2015. Cell wall proteome of sugarcane stems. *BMC Plant Biology*.

Labate MTV, Boaretto LF, Gonzalez SG, Franceschini LM, Cataldi TR, Quecine MC, Budzinski IGF, Moraes FE, Labate. 2015. Quantitative proteomics of sugarcane culms reveals changes in the regulation of carbon metabolism during sucrose accumulation. *Journal Proteome Research*.

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