Proteome characterization of the primary cell wall from sugarcane leaves

Authors: [1]Rodrigues, M.J.C; [1]Salvato, F.; [2]Douché, T.; [2]Jamet, E.; [2]Pont-Lezica, R.; [1]Labate, C.A.

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[1]Escola Superior de Agricultura "Luiz de Queiroz"-Universidade de São Paulo. Laboratótio Max Feffer de Genética de Plantas. Brasil.

[2]Université Paul Sabatier. Laboratoire de Recherche en Sciences Végétales (LRSV). França.

The use of sugarcane as a raw-material to ethanol production is in expansion due to its environmental gains in comparison to oil. Weakly bound cell wall proteins from sugarcane leaves were identified using a proteomic and bioinformatics approach. This work was developed to produce information to support the use of plant cell wall, component of the sugarcane bagasse, in order to produce cellulosic ethanol, eliminating residues and cooperating with the energy generation. To do so, leaves from 2-month-old plants were collected and submerged into solution containing 5 mM acetate buffer, 0,3 M mannitol and 0,2 M $CaCl_2$. Then, they were submitted twice to a 10 minutes vacuum infiltration and the same was done replacing the calcium chloride for 2M LiCl. After infiltration, the tissues were centrifuged and the extracted proteins were separated in a SDS-PAGE (one dimension), digested and sequenced through ESI-Q-TOF (LC-MS/MS). Therefore, the proteins were extensively analyzed using bioinformatic programs, such as MASCOT, SignalP, PSORT, TargetP, TMHMM and Predotar, to identify them and predict the subcellular location in the cell. Of the 91 proteins that were identified, the biggest proportion, 48 (52,75%), had a signal peptide, whereas 43 were predicted as being originated from the cytoplasm. From the apoplastic proteins that we have found, most of them were cell wall modifying enzymes, such as hydrolases, which act on the rearrangement of the polysaccharides during development, allowing certain flexibility. Numerous glycoside hydrolases and proteinases were found, in agreement with the expected role of the extracellular matrix in polysaccharide metabolism and signaling phenomena. Others were classified as proteinases, defense-related proteins, such as peroxidases, interaction proteins, several functions and unknown. In this way, we were able to generate valuable information about sugarcane cell wall, that can lead to future studies to enhance the cellulosic ethanol production.

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