CHARACTERISATION OF THE CELL WALLS FROM ROOTS OF SUGARCANE: A FIRST STEP TO ACHIEVE 2ND GENERATION BIOETHANOL USING PLANT CELL WALL DEGRADATION MECHANISMS

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In order to reach 2nd generation bioethanol, one possibility to achieve efficient hydrolysis is to use the plant systems themselves which is some cases are capable to hydrolyse cell walls. In this work, we have characterised a lysigenous aerenchyma that involves complete wall degradation during development. This discovery provides an opportunity to learn more about how these walls can be efficiently hydrolysed therefore providing means to design better industrial processes for hydrolysis as well as new varieties of sugarcane that degrade their own walls. Roots cell walls were fractionated using sodium chlorite, ammonium oxalate, sodium hydroxide 0.1, 1 and 4M. The monosaccharide composition was obtained by HPAEC-PAD and wall characterisation was performed using glycomics profiling. We observed that pectins were found in the more soluble fractions. Along with pectins, we found evidence of the presence of beta-glucan and arabinoxylan. Arabinoxylan were extracted mostly in the 1M NaOH fraction. In this fraction, some beta-glucan was released, but a higher amount was found in the 4M NaOH fraction. Xyloglucan was also detected in this fraction and from the monosaccharide composition it is likely that it is the main polysaccharide in this fraction. The residual fraction is composed of cellulose along with some xylan, demonstrating that this polysaccharide can strongly interact with cellulose microfibers. Our findings provide valuable information about the polymers present in the root walls, making possible to follow the changes in walls during aerenchyma formation and therefore opening the way to understand natural cell wall degradation processes in sugarcane.

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