Simultaneous or sequential treatment of sugarcane bagasse with laccase from *Peniophora cinerea* prior to enzymatic hydrolysis with cellulases

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The extent of polysaccharide degradation of lignocelluloses is closely dependent of the extent of lignin removal. Biomasses with reduced lignin contents are easier to digest with cellulases. Considering that plants down regulated on lignin biosynthesis are upcoming, future processes for cellulosic-ethanol production seem to be focused on milder pretreatments followed by efficient enzymatic hydrolysis of the entire polysaccharide fraction. Thus, one sample of a mill-processed bagasse was partially delignified by sodium chlorite in aqueous acetic acid solution and total lignin contents decreased rapidly, from 24% to 19% after 1-h treatment. Chlorite-treated sugar cane bagasse was sequentially or simultaneously treated with crude laccase from *Peniophora cinerea* and a commercial cellulase preparation. Laccase treatment of sugarcane bagasse was performed in the presence or absence of mediators (syringaldehyde and linoleic acid). The simultaneous treatment of bagasse with laccase/cellulases resulted in lower hydrolysis of cellulose than the control with cellulase, especially in reactions containing the mediators. Laccase treatment, even in the presence of chlorite-treated sugar cane bagasse, inhibited cellulase activity. The sequential treatment was carried out first with laccase at 50 °C, 120 rpm for 6 hours. After that, the pretreated material was washed with water or 0.1% NaOH to remove soluble lignin and then hydrolyzed by cellulases. The bagasse treated sequentially by laccase and cellulase also produced less soluble sugars than the control with cellulase. Effective laccase treatment could help on lignin solubilization by alkali and would favors the subsequent action of cellulases. Presumably, changes in the lignin or unproductive adsorption of enzymes caused lower conversion of cellulose in treatments with laccase from *P. cinerea*.

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