

Improvement of ethanol production of hydrothermally pretreated *Eucalyptus* wood by cheese whey incorporation

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Hydrothermal pretreatment has been used for the improvement of ethanol production from *Eucalyptus globulus* wood by simultaneous saccharification and fermentation process (SSF). Nevertheless, the ethanol concentration is limited to percentage of cellulose present in the pretreated biomass which resulted in a maximal concentration of 67 g/L [1]. Therefore, one of the limitation of lignocellulosic-to-ethanol process is the difficulty of using high solid loadings to attain high ethanol concentration (required to reduce distillation cost). On the other hand, cheese whey powder is a pollutant residue that can be fermented into ethanol by addition of microorganism able to consume lactose [2]. In this work, a multi-waste valorization approach, mixing cheese whey and hydrothermally pretreated *Eucalyptus globulus* wood, was proposed for the improvement and intensification of lignocellulose-to-ethanol process to attain high ethanol concentration. For that, an experimental design was carried out to optimize the operational conditions (percentage of cheese whey and commercial enzymes loadings of β -galactosidase and cellulases) to produce ethanol by SSF using an industrial Ethanol Red® *Saccharomyces cerevisiae* strain [3]. Ethanol concentration of 93 g/L (corresponding to 94% yield) was obtained under optimized conditions. Moreover, Ethanol Red® strain was genetically engineered for the production of β -galactosidase. Recombinant strain successfully fermented the mixture of sugars from pretreated *Eucalyptus* wood and cheese whey, achieving an ethanol yield of 96%.

[1] Fuel (2012) 94, 305–312.

[2] Journal Chemical Technology and Biotechnology (2004) 79, 809–815.

[3] Bioresource Technology (2018) 250, 256-264.