

# BIOETHANOL PRODUCTION BY *SCHEFFERSOMYCES STIPITIS* CBS 6054 FROM CORN COB CELLULOSIC HYDROLYSATE DURING SHF PROCESS

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Corn cob is one of the residues coming from the maize processing, which represents approximately 18 kg (70% wet basis) after processing 100 kg of maize. Corn cob is a lignocellulosic material composed by cellulose, hemicellulose and lignin. The hemicellulosic and lignin fractions can be almost totally removed from corn cob by using a mild chemical pretreatment process as diluted sulphuric acid or alkaline. The remaining cellulose containing fewer amounts of those fractions can be converted enzymatically to bioethanol. There are many ways to produce ethanol from biomass as separate hydrolysis and fermentation (SHF), simultaneous saccharification and fermentation (SSF), simultaneous and saccharification co-fermentation (SSCF), consolidated bioprocessing (CBP), and integrated bioprocessing (IBP). The aim of this work was to produce ethanol by the SHF process using optimized conditions of diluted sulfuric acid pretreatment and dosage of the commercial enzymatic complex CellicCTec 2 from Novozymes. Enzymatic hydrolysis were conducted using 10% of solid in Erlenmeyer flasks (125 mL) containing of 50 mL of medium prepared with sodium citrate buffer (50 mmol.L<sup>-1</sup>, pH 4.8), CellicCTec 2 25.50 FPU/g dry lignocellulosic material) and Tween 80 (9.8 % w/w) under 200 rpm at 50 °C. The *Scheffersomyces stipitis* CBS 6054 inoculum (2.5 g/L) was freshly harvested (24h) after cultivation in Erlenmeyer flasks (1000 mL) containing 400 ml YEPD with 30 g/L of glucose under 200 rpm at 30 °C. The enzymatic hydrolysis of the corn cob pretreated by diluted acid sulfuric produced a medium containing glucose (61.98 g/L), xylose (13,02 g/L) and cellobiose (6,45 g/L), which was supplemented with yeast extract (5g/L), MgSO<sub>4</sub>.7H<sub>2</sub>O (0.5 g/L), (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> (3,0 g/L) prior to its fermentation to produce ethanol by the yeast. The fermentation conditions were 150 rpm at 30 °C. The cell yield was 0.23 (g/g). The maximum specific consumption rate for glucose, xylose and cellobiose were 0,62 g<sub>glucose</sub>/g<sub>cel</sub>.h, 0,13 g<sub>glucose</sub>/g<sub>cel</sub>.h and 0,03 g<sub>glucose</sub>/g<sub>cel</sub>.h, respectively. This yeast fermented efficiently the sugars glucose (98,95%), xylose (64,90%) and cellobiose (60,12%) to ethanol with high yield (0.37 g/g) and volumetric productivity (1.02 g<sub>ethanol</sub>/L.h). The present work enabled an alternative route for the production of bioethanol from corn cob in which Tween 80 was used as coadjuvant. Moreover, it was found that the selected strain was promising because it was able to use glucose, xylose and cellobiose as a source of carbon for fermentation.

**Keywords:** Bioethanol; *Scheffersomyces stipitis*; SHF; Corn cob.

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