STUDY OF PARAMETERS TO OBTAIN GLUCOSE OF AGAVE BAGASSE USIGN EXPERIMENTAL DESIGN

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Keywords: agave bagasse, enzymatic hydrolysis, Tween 80.

Introduction. Lignocellulosic materials used to produce sugars such as glucose and xylose, represent a sustainable and friendly environmentally alternative. In Mexico, these materials are produced in large quantities due production of distilled spirits, one of them is Agave Bagasse (1). Yield of cellulose saccharification processes is increased when the barrier of lignin is removed (2). Use of surfactants such as Tween 80 has proven to increase the enzymatic hydrolysis of various cellulosic materials (3,4,5,6).

The aim of this study was to characterize the agave bagasse *Angustifolia Haw* (BAA), and perform a screening test to determine useful doses to optimize the enzymatic hydrolysis (EH) of BAA delignified using low concentrations of enzymes and Tween 80 as surfactant, by reference to studies in sugarcane bagasse whit similar lignocellulosic content.

Methods. The agave bagasse was obtained from the factory of Mr. Joel Hernández Santiago, in Oaxaca, City. Lignocellulosic analysis was performed using ANKOM norm. Acid hydrolysis was performed with a solution of H_2SO_4 2% v/v, at 125 °C for 40 min, using a solid: liquid ratio (RSL) 1:9, lignin was removed from bagasse residual with a 4.7 % solution of H_2O_2 w/v in RSL 1:17.1, contact time of 26.7 h under alkaline conditions, finally the EH was performed using Box-Behnken design considering as independent variables: *Cellulase* C_C (400, 525 and 650 µL), *Beta-glucosidase* C_B (500, 700 and 900 µL) and *Tween 80* C_T (100, 850 and 1600 µL), being the response variable glucose concentration (C_G) in g/L, which was determined by HPLC. Buffer sodium acetate 0.05 M, pH 4.8, adding a delignified BA RSL 1:9, incubation time 72 h at 50 °C and 200 rpm, contact time tween 80 prior to incubation was 5 h.

Results. The BAA contains 34.07% cellulose, 10.8% hemicellulose, 13.1% lignin and 42.1% extractives. Results were analyzed statistically adjusting a model (Ec. 1) with a 95.4%.adjustment of the accuracy. ANOVA analysis shows that the most statistically significant factor is C_B.

$$C_G = 32.13-3.2*C_C+4*C_B+2.01*C_T+5.02*C_C^2+2.55*C_B^2-3.75*C_T^2+1.2*C_C*C_B+3.05*C_C*C_T+3.27*C_B*C_T+6.9*C_C*C_B^2-5.7*C_B*C_T^2 \quad (1)$$

The maximum conversion of glucose was 48.6 g/L. Contour plots (Fig. 1), employed ranges not possible to determine an optimal zone to obtain glucose. Higher levels of C_C and C_B, are necessary. In this area the curvature of the model isn`t reached to ensure optimum.

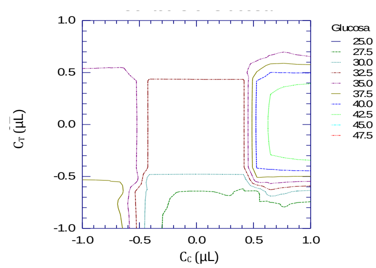

Fig.1 Contour plot of enzymatic hydrolysis with Tween 80

Conclusions. BAA contains about 45% of possible saccharify material. C_B is the most significant factor. With these conditions 43 g/L of glucose were produced. Another experimental design will be proposed.

Acknowpledgements. At DGEST to financial project 4605/4606.12-P

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