TITLE: ETHANOL PRODUCTION FROM RICE-HUSK ACID-HYDROLYSATE IN SEMI-SOLID FERMENTATION BY *Zymomonas mobilis*

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ABSTRACT:

The increased demand of global energy mostly based in fossil resources has promoted a progressive depletion of nonrenewable-energy resources, bringing a series of social, economic and environmental problems. To mitigate this energy crises new technologies based in sustainable energy have been intensively researched. Among of others alternative technologies, the use of lignocellulosic biomass to produce second-generation biofuels have gained great attention. This technology avoids food-production competition and contribute to environmental and economical sustainability through the use of low cost raw-materials. The present study aimed to explore the potential of *Zymomonas mobilis* CP4 to produce ethanol from rice-husk hydrolysate, an important lignocellulosic residue, through submerged, solid-state and semi-solid fermentation experiments. Rice husk was hydrolyzed with H_2SO_4 8 % (w/w) at a solid-liquid ratio of 1:2 (v/v) for 30 minutes at 121 ° C / 1 ATM. The hydrolysate was neutralized with ammonium hydroxide and used as partial substituent to the fermentation medium (source of fermentable sugars). Cotton and remaining solid from the acid hydrolysis were used as solid support for the solid-state and semi-solid experiments. The semi-solid fermentation provided a significant increase ($p<0,05$) in ethanol production when compared to the submerged liquid and solid-state fermentation processes. Furthermore, an additional yield increment ($p<0,01$) was reached when remaining solid from the acid hydrolysis was used as solid support instead cotton, reaching 8 g/L. Here we showed that a twostep process, rice-husk hydrolysate followed by semi-solid fermentation using as solid support the remaining solid from the acid hydrolysis, was an interesting sustainable alternative for second-generation ethanol production by *Zymomonas mobilis*.

Keywords: *Zymomonas mobilis*, bioethanol, lignocellulosic biomass, acid hydrolyzate