Implication of Fluidized bed reactor (FBR) for improved ethanol production from sugarcane bagasse hemicellulose hydrolysate

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This work is associated with the thematic Project: "Ethanol: research and development aiming to the integrated use of sugarcane bagasse to biotechnological production of lignocellulosic ethanol (FAPESP Process 2008/579264). The present work aims to contribute to the development of an environmentally and economically viable technology for ethanol production from sugarcane bagasse hemicellulosic hydrolysates in fluidized bed operations using the immobilized cells of *Pichia stipitis.* We are in priliminary phase to start this work. Our objectives include the techniques to characterize the raw material (bagasse from sugar cane), for the characterisation of composition of cellulose, hemicellulose and lignin. A reproducible technology will be developed for the preparation and characterization of the hydrolyzate for the content of sugars and toxic compounds by using dilute sulfuric acid hydrolysis followed by a detoxification strategy using the activated charcoal adsorption. This detoxified sugar syrup will be used for continuous ethanol production in FBR using the calcium alginate entrapped *P. stipitis* cells. The resulting immobilized system will be characterized for its physical, morphological and biochemical characteristics, aiming at first to evaluate their suitability for use in fluidized bed reactor, especially designed for this purpose, allowing a more efficient extraction of the hydrolyzate, and consequently better process performance. After this stage, to optimize the process will be conducted fermentations in batch system, evaluating the influence of the concentration of xylose co-substrate concentration and flow aeration in the system. The co-substrate will be evaluated as a way to evaluate the possibility of simultaneous consumption of hexoses and pentoses by yeast. The experiments will be conducted as a factorial design 2^3. Additional experiments may be incorporated by statistical analysis of the process. In the last stage of the project, experiments will be carried out with the reactor operating in continuous mode in order to evaluate the best performance in ethanol production in the fluidized bed reactor.

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