SOLID-STATE FERMENTATION PACKED BED BIOREACTOR SIMULATION FOR CELLULASE PRODUCTION

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ABSTRACT Cellulase has been successfully produced by solid-state fermentation in experimental packed beds. However, for bioreactor scale-up simulation is a skilful technique, since enzyme production decrease due to thermal heterogeneity can be forecast before a large equipment is assembled. Hence, this contribution addresses the simulation of a packed bed filled sugar cane bagasse and wheat bran as substrate (weight proportion 7:3) for *Myceliophtora sp.* cultivation for cellulase production. A Matlab® program was developed using the mathematical model of Sangsurasak and Mitchell (1998), forecasting the temperature as a function of time and of the axial and radial positions. This model includes the heat metabolically generated by the microorganism and water evaporation by the air from the solid particles. The finite difference method was applied to discretize the variables. Fungal growth was estimated using the logistic model and heat generation was estimated from the oxygen consumption, assuming that each mol of consumed oxygen generates 555 kJ of heat. Temperature profiles were obtained as a function of time and space, and they were confirmed by experimental values experimentally obtained in previous works. No radial temperature variation was observed and the highest temperature increase was about 5°C above the process temperature (45°C).

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