OPTIMISATION STUDIES OF AN ATOXIGENIC STRAIN OF *PITHOMYCES CHARTARUM* IN SUBMERGED FERMENTATION

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ABSTRACT

The conditions for maximum biomass concentration and propagule production by an atoxigenic strain of *Pithomyces chartarum* were investigated, in shake-flask and submerged fermenter. On the shake-flask scale, a variety of carbon sources, nitrogen sources, growth additives and pH values were studied as medium components and conditions. The dry weight biomass and the rate of substrate utilisation were used to assess the growth of the organism, while the number of colony-forming-units per unit volume was also determined following a standard homogenisation procedure, to monitor organism viability. The organism was shown to be capable of utilising a wide range of nutrient sources. Glucose and casamino acids were the best carbon and nitrogen sources, respectively, while the optimum culture pH value was in the broad range pH 4 to 7. The effect of growth additives was negligible.

The performances of different strains of the organism on the semi-defined medium were compared and two of the three strains tested grew to desirable parameters. The third strain, however, was reluctant to sporulate despite repeated efforts. This non-sporulating strain did produce the greatest biomass concentration however. Following the establishment of a semi-defined medium, a possible production medium was formulated by replacing the nutritional components of the defined medium with low-cost complex substrates. The use of whey permeate was investigated for this role. The results showed that whey permeate alone was a poor medium; however when supplemental carbon sources, such as starch or sucrose, were added, the viability counts and biomass produced were the greatest yet achieved.

Studies of the effect of agitation, aeration and inoculum size were conducted in small-scale submerged fermentation. This technology was demonstrated to be satisfactory for production of *P. chartarum* biomass. In the range of these variables studied, however, there was little effect noted on the viability or biomass concentration produced. Finally, the effect of storage of the harvested biomass on its viability was studied. It was shown that the viability of the organism decreased markedly with storage over a 3-month period, and that the preserving techniques tested had little effect in reversing this trend.

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