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Establishing a Microbial Co-Culture for Production of Cellulases Using Banana (Musa Paradisiaca) Pseudostem

Authors : Mulanga Luscious Mulaudzi, Ignatious Ncube

Abstract : In nature, enzymatic degradation of lignocellulose is more efficient compared to in vivo bioprocessing. Thus, a co-culture should enable production of more efficient enzyme preparations that would mimic the natural decomposition of lignocellulose. The aim of the study was to establish a microbial co-culture for the production of highly active cellulase preparations. The objectives were to determine the use of a variety of culture media to isolate cellulose degrading microorganisms from decomposing banana pseudo stem and to optimize production of cellulase by co-cultures of microorganisms producing high levels of cellulose. Screening of fungal isolates was done on carboxylmethylcellulose agar plates which were stained with Congo red to show hydrolytic activity of the isolates. Co-culture and mixed culture of these microorganisms were cultured using Mendel salts with Avicel as the carbon source. Cultures were incubated at 30 °C with shaking at 200 rpm for 240 hrs. Enzyme activity assays were performed to determine endoglycosidase and β-glucosidase. Mixed culture of fungi-dead bacterial cells showed to be the best co-culture/ mixed culture to produce higher levels of cellulase activity in submerged fermentations (SmF) using Avicel™ as a carbon source. The study concludes use microorganism 5A in co-cultures is highly recommended in order to produce high amounts of β-glucosidases, no matter the combination used.

Keywords : avicel, co-culture, submerged fermentation, pseudostem
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