

Improved Production, Purification and Characterization of Invertase from *Penicillium lilacinum* by Shaken Flask Technique of Submerged Fermentation

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Abstract : Recent years researchers have been motivated towards extensive exploring of living organism, which could be utilized effectively in intense industrial conditions. The present study shows enhanced production, purification and characterization of industrial enzyme, invertase (Beta-D-fructofuranosidase) from *Penicillium lilacinum*. Various agricultural based by-products (cotton stalk, sunflower waste, rice husk, molasses and date syrup) were used as energy source. The highest amount of enzyme (13.05 Units/mL) was produced when the strain was cultured on growth medium containing date syrup as energy source. Yeast extract was used as nitrogen source after 96 h of incubation at incubation temperature of 40° C. Initial pH of medium was 8.0, inoculum size 6×10^6 conidia and 200 rev/min agitation rate. The enzyme was also purified (7 folds than crude) and characterized. Molecular mass of purified enzyme (65 kDa) was determined by 10 % SDS-PAGE. Lineweaver-Burk Plot was used to determine Kinetic constants (V_{max} 178.6 U/mL/min and K_m 2.76 mM). Temperature and pH optima were 55° C and 5.5 respectively. $MnCl_2$ (52.9 %), $MgSO_4$ (48.9 %), $BaCl_2$ (24.6 %), $MgCl_2$ (9.6 %), $CoCl_2$ (5.7 %) and $NaCl$ (4.2 %) enhanced the relative activity of enzyme and $HgCl_2$ (-92.8 %), $CuSO_4$ (-80.2 %) and $CuCl_2$ (-76.6 %) were proved inhibitors. The strain was showing enzyme activity even at extreme conditions of temperature (up to 60° C) and pH (up to 9), so it can be used in industries.

Keywords : invertase, *Penicillium lilacinum*, submerged fermentation, industrial enzyme

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