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Optimization of Culture Conditions to Yield High Alkaline Protease Titre

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The work was aimed at optimizing the culture conditions to produce high titre of alkaline protease production by *Paenibacillusdendritiformis*. Single colony of the strain was cultivated in nutrient-agar medium containing (gL^{-1}) nutrient broth, 10.0; peptone, 10.0; sodium chloride, 5.0; and bacteriological agar, 17.5 at pH 7.0 at 37°C for 24h. The cells activated for 18h at 40°C and 120 rpm were inoculated to the fermentation medium and incubated at 40°C and 120 rpm. The activation and fermentation media were same and contained (gL^{-1}) glucose, 10.0; peptone, 6.0; yeast extract, 2.0; KH_2PO_4, 10.0; $MgSO_4.7H_2O$, 0.2; and Na_2CO_3, 10.0; at pH 9.5. Highest alkaline protease activity [91.2(±1.7) UmL^{-1}] was obtained at 120h and 37°C. The agitation speed of 200rpm was most suitable and the highest protease production [112(±1.4) UmL^{-1}] was obtained at 96h and 37°C. The 36 hours old slant culture was suitable to inoculate the fermentation medium for high titre of alkaline protease production [122.9 (±1.3) UmL^{-1}] at 96h. Highest alkaline protease activity [138(±2.8) UmL^{-1}] was obtained at 96h, when the age of inoculum was 18 hours. When the medium to shake flask volume ratio was 1:20, highest alkaline protease activity [141.2(±3.3) UmL^{-1}] was obtained at 96h d. To obtain highest alkaline protease activity [151.8(±4.3) UmL^{-1}] at 96h, the inoculum size of 16.67(v/v) was chosen. Before optimizing the culture conditions, protease activity produced at 120h was 91.2 (±1.7) UmL^{-1} but after optimization the highest activity produced at 92h was 162(±1.4) UmL^{-1}. Therefore 1.8fold increase in protease activity was achieved after optimizing the process parameters with a reduction in production time from 120 to 92h.

Keywords: Protease, inoculums, strain, optimum,medium,Paenibacillusdendritiformis