Improved mannan-degrading enzymes' production by Aspergillus niger through medium optimization.

ABSTRACT

The effect of different carbon and nitrogen sources on the production of mannan-degrading enzymes, focussing on β-mannanase, by Aspergillus niger was investigated using shake flask culture. The β-mannanase activity obtained during growth of A. niger on guar gum (GG, 1495 nkat mL−1) was much higher than those observed on other carbon substrates, locust bean gum (1148 nkat mL−1), α-cellulose (10.7 nkat mL−1), glucose (8.8 nkat mL−1) and carboxymethylcellulose (4.6 nkat mL−1). For fermentation using GG as a carbon source, bacteriological peptone gave the highest β-mannanase activity (1744 nkat mL−1) followed by peptone from meat (1168 nkat mL−1), yeast extract (817 nkat mL−1), ammonium sulphate (241 nkat mL−1), ammonium nitrate (113 nkat mL−1) and ammonium chloride (99 nkat mL−1) when used as a nitrogen source. The composition of bacteriological peptone and initial pH of the medium were further optimized using response surface methodology (RSM). Medium consisted of 21.3 g L−1 GG and 57 g L−1 peptone with initial culture pH of 5.5 was optimum for β-mannanase production (2063 nkat mL−1) by A. niger. The β-mannanase production obtained in this study using A. niger was significantly higher than those reported in the literature.

Keyword: Aspergillus niger; Hemicellulose; Mannanase; Carbon and nitrogen; Carbon substrates.