Thesis Title Modification of Culture Conditions for the Production of Highly Active Cellulase from Myceliophthora thermophila

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Abstract

Attempt was made to improve the culture conditions for Myceliophthora thermophila so as to produce highly active cellulase. It was found that cultivation of the fungus on a solid medium composing of 8 grammes of rice bran and 2 grammes of rice straw treated with Sodium hydroxide (NaOH), Sodium sulphite (Na_2SO_3) , Hydrochloric acid (HCl) in the concentration range of 0.5-3% or 25-95% ethanol, gave a better activity of the enzyme. Among them, rice straw treated with 3% HCl at 100 ^{o}C for 1 hour, was the most effective medium, giving maximal activity of Carboxymethyl cellulase approximately 1.76 times the activity obtained from untreated straw. Aeration of the culture with sterile air at the rate of 20-50 mililiter per minute, gave lower activity of Carboxymethyl cellulase than that from unaerated culture.

In addition to hydrolysis of Carboxymethyl cellulose, all the enzymes so produced, could catalyze hydrolysis of rice bran and rice straw. The cellulase from culture medium containing rice straw treated with 3% NaOH was the best in carrying out such hydrolysis. Within the reaction time of six hours, the percentage of conversion was found to be 59.21% for rice bran and 70.82% for rice straw treated with 2% NaOH. In the case of untreated straw, the enzyme from the fungus cultured on the medium containing untreated straw was the best, giving 35.2% of conversion within 6 hours.

When the crude enzymes were treated with $(NH_4)_2SO_4$ 30-65 % saturation, the partially purified preparations were obtained, which, could catalyze the hydrolysis of rice bran and untreated rice straw with low percentage of conversion between 12.6-16.9% and 1.05-4.8% respectively, whereas with rice straw substrate treated with 2% NaOH, the conversion was 51-66% . Polyacrylamide disc gel electrophoresis of the partially purified cellulase from the medium containing untreated rice straw or the rice straw treated with 3% NaOH revealed four protein bands, which, were resolved further to seven bands by SDS-polyacrylamide gel electrophoresis. In both cases, all the protein bands moved over the same distances correspondingly.