ABSTRACT

Cost-effective techniques are required for the economical and efficient production of cellulases since biofuel and energy demand has been increased which motivated scientists to pursue sustainable and novel sources for biofuel production using cellulases. Pakistan produces approximately 50 to 60 million tons of cellulosic biomass every year. The present research was planned with an aim to produce cellulases from locally isolated fungi. Sixty strains were isolated and out of these strains, 45 were screened out to produce cellulases (exo-glucanase, endo-glucanase and β-glucosidase). All strains showed good enzyme activity but *Aspergillus* sp. (strain SHK 8) showed maximum cellulases activities. Different physical and cultural parameters were optimized in order to enhance the cellulases activities. After optimization CMC-ase activity was 17.06 ± 0.195 U/mL/min at 30°C (optimum temperature) after 5 days of incubation when 1.5 mL inoculum was used. Wheat bran (5 g) was selected as best substrate. Among all carbon and nitrogen sources, CMC and yeast extract were proved to be the best sources for enhancement of cellulases activity. Maximum enzyme activity was obtained when 1 % yeast extract (nitrogen source) and 1 % CMC (carbon source) were used at pH 6.0 under solid-state fermentation. Effects of different media on the cellulases activities were analyzed and results showed that medium 3 was best medium for cellulases production. Maximum exo-glucanase activity was obtained as 4793.9 ± 18.48 U/mL/min in the presence of yeast extract as nitrogen source and CMC as carbon source at 6.0 pH using 2 mL inoculum. Maximum β-glucosidase activity was obtained as 4693.1 ± 18.92 U/mL/min in the presence of fructose (carbon source) and yeast extract (nitrogen source) at pH 6.0. Results showed that pH 6.0 was the optimum pH. Total protein was calculated as 1.37 ± 0.014 mg/mL. Moisture to solid ratio was adjusted as 1:3. Substrate utilization under solid-state fermentation was 84 % ± 0.009. This suggests that microbial cellulases play a chief role in numerous industries including textile, paper and pulp, food, biofuel, chemicals, detergents, animal feed, wine making, biofuel production, fermentation process, biomass refining, laundry and agriculture.