ABSTRACT

A potential indigenous fungal natural isolate *Aspergillus fumigatus* was subjected to mutation by gamma-ray irradiation and N-methyl-N$^{/}$-nitro-N-nitrosoguanidine (NMG). After 1.6 kGy gamma-ray irradiation, five mutants showed significantly higher cellulase activity than the parent. Among these mutants, the strain AFMG 20 had an increase in exteracellular soluble protein by 93.22%, reducing sugar by 300%, avicelase by 42.30%, CMCase by 41.17% and β-glucosidase activity by 36.66% over the parent. However, none of the gamma-ray induced mutants showed resistance to catabolite repression. Five NMG induced mutants (AFMN 04, AFMN 17, AFMN 26, AFMN 37 and AFMN 44) appeared to have good potentiality in resisting catabolite repression when grown in liquid Mandels medium containing 1% alkali-treated bagasse added with 5% glucose. These five NMG induced mutants released 6.98-9.85 g/l extracellular soluble protein, 2.56-4.88 g/l reducing sugar, 0.34-0.44 U/ml avicelase, 0.21-0.32 U/ml CMCase and 0.90-0.98 U/ml β-glucosidase activity whereas the parent *Aspergillus fumigatus* released 4.01 g/l protein, 0.58 g/l reducing sugar, 0.31 U/ml avicelase, 0.20 U/ml CMCase and 0.55 U/ml β-glucosidase activity when the liquid Mandels media contained 1% alkali-treated bagasse along with 5% glucose. Amongst all the five presumptive catabolite derepressed mutants, AFMN 04 showed the best cellulase activity followed by mutant AFMN 26 and AFMN 37. Saccharification of 7.5% alkali-treated natural agro-waste such as sugar cane bagase, rice straw and jute stick by the extracellular crude enzyme preparation of the mutant strain AFMN 04 released 57.12 g/l, 55.25 g/l and 50.17 g/l reducing sugar at 96 hours respectively, while the parent strain released 37.13 g/l, 36.50 g/l and 35.58 g/l reducing sugar under similar incubation condition. In commercial cellulosic substrates such as avicel, CMC, xylan and starch, highest amount of reducing sugar (43.78 g/l) was obtained at 96 hours saccharification of 7.5% xylan by the extracellular preparation of catabolite repression resistant mutant AFMN 04.