Abstract

The present study deals with calcium-alginate entrapment of a thermotolerant laccase from glucose-deficient auxotrophic *Aspergillus niger* for detoxification of industrial waste water. *A. niger* was grown under different concentration of tryptophan (0.005-0.03%) and expose to UV radiations from different distances (5-30 cm) for different time intervals (5-30 min). Out of 34 mutant strains, UV-da-5 was able to produce 6.51±0.32 U/g of laccase which was remarkably higher than the wild-type ISL-9 3.42±0.17 U/g. Solid state fermentation was employed by using corn cobs as substrate. The properly dried corn cobs were pretreated with 0.01N HCl and oven dried at 70°C for 30 min. The selected UV-da-5 and ISL-9 were optimized for several parameters viz. substrate level (ISL-9 7.5g, UV-da-5 12.5 g), Substrate to moisture ratio (1:0.75), incubation time (48 h) and inoculum size (1 ml). Moreover, immobilization of laccase on calcium alginate beads was evaluated. Entrapment was optimized by procurement period (15 min), bead size (3 mm) and incubation temperature (60°C) which revealed higher laccase activity 12.33±0.49 U/g by UV-da-5 and 7.74±0.30 U/g by ISL-9. Further crude and partially purified laccase of ISL-9 and UV-da-5 were used to detoxify the industrial waste water collected from six important industries of Pakistan i.e. CPBM, PTI, AMF, LDP, CCLP and BLP. The partially purified UV-da-5 was found to hydrolyze 50% dilution of CCLP (at 45°C for 50 min) up to 94±3.76%. From this study, it was concluded that laccase exhibited exceptionally superior efficiency to detoxify industrial effluents. So, it can be a promising candidate for biological detoxification of industrial waste water.