# Abstract

Recent urbanization and industrialization have produced immense wastes which are being released in environment resulting in more pollution. Human health and natural aquatic habitats have been affected by water pollution caused by colossal textile effluent untreated discharge into aquatic bodies. The conventional physiochemical treatment methods are rather ineffective for removal of variety of textile effluents from water. While bioremediation is environmentally beneficial, cost effective as well as sustainable approach for treatment of wastewater of textile industries. The heterologous biological compounds which are difficult to degrade are now biodegraded by laccases obtained from bacterial strains. Laccases are multi-copper oxidases having broad range of biotechnological applications. In this research we have isolated and characterized bacterial laccases for biodegradation of Reactive Black-5, Reactive Yellow-145, Direct Red-80 and Disperse Blue-284 textile dyes. Guaiacol and ABTS were utilized as laccase inducers. Six out of twenty bacterial isolates were laccase producing bacteria. Maximum laccase production by laccase positive strains were observed after 96-120 hours of incubation at 37° C. The laccases were purified by passing 96-120 hour incubated bacterial culture supernatant through MCWO-concentrator which was further purified by flowing through sepharose-66 chromatography column. The Reactive Yellow-145 was biodegraded by purified laccases with 95%, 93.44%, 85.6% and 74.16% biodegradation by GY3, AY4, N4 and EF, respectively after 24 hours of incubation at 37°C. The bioremediation of Reactive Black-5 occurred up to 87.7%, 89.14%, 91.36% and 95.9% by EF, N4, AY4 and GY3 during incubation set at 37° C for 24 hours. The bioremediation of Direct Red-80 occurred up to 96.05%, 96%, 94.26% and 81. 33% by EF, GY3, AY4 and N4 respectively after incubation set at 37° C for 24 hours. The bioremediation of Disperse Blue-284 occurred up to 95.2%, 91.17%, 90.8% and 84.61% by N4, GY3, AY4 and EF respectively. In all experiments, 5000ppm of dye concentration was used in reaction mixture having 1:1 ratio laccase with 0.5 ml of dyes were used. The UV-visible spectroscopy also confirmed dye degradation by laccase enzyme.