

ABSTRACT

Laccases (benzene diol: oxygen oxidoreductase, EC 1.10.3.2) are most extensively studied group of lignocellulolytic enzymes among blue multicopper oxidases. It was for the first time described from sap of Japanese lacquer tree *Rhus vernicifera*. The laccases show broad substrate specificity due to oxidation of inclusive range of phenolic compounds and aromatic amines. In the current research work, 50 soil samples used for isolation of locally isolated laccase producing fungi resulted in 8 isolates of fungi to be positive. Out of these 8, S20 (Tamkeen) resulted as best isolate showing highest value of enzyme activity by guaiacol laccase enzyme assay. It was later on subjected to molecular identification. This local strain identified as *Aspergillus oryzae*, was used in solid state fermentation for laccase enzyme production. Its production and optimization were also done. The profile of laccase enzyme which was obtained after the guaiacol enzyme assay for laccase activity, exhibit the fermentation time for the laccase production to be 5 days of incubation. Among all the used lignocellulosic substrates, laccase enzyme exhibited best activity in presence of wheat bran as substrate. The classical technique called one variable at a time or OVAT was used for the optimization of all the cultural conditions. The OVAT used for laccase production gave optimum value for the best identified strain of fungi at incubation time of 5 days, temperature to be 30 °C, moisture content 1:2, inoculum size to be 2 ml, glucose 2 % and yeast extract 2% as carbon and nitrogen sources, respectively. The optimized value for fungal laccase production recorded in this research work was 1.97 U/ml. The reactions were allowed to run in triplicates, these values were obtained by finding its average. The findings of this research work described optimized conditions for solid state fermentation of indigenous *Aspergillus oryzae* that is capable of producing the laccase enzyme in an economic and ecofriendly way. A lot of attention was received to these fungal laccases recently, due to its unique oxidative and catalytic activities. These laccases are helpful in degradation of lignin or the removal of potentially harmful phenols which arises during the lignin degradation to a less toxic or no toxic byproduct.