

## Abstract

The present study was conducted on production of laccase from *Rhizopus stolonifer* and its commercial applications. *R. stolonifer* was used for the production of laccase enzyme using surface culture fermentation technique. The effects of various parameters were checked using OFAT technique on the production of laccase enzyme such as effect of pH, incubation temperature and period, various sources of laccase inducers, carbon and nitrogen, various concentration levels of micronutrients were observed on the production of laccase enzyme. The results indicated that 15g galactose, 10g peptone, 1g  $\text{KH}_2\text{PO}_4$ , 0.2g  $\text{ZnSO}_4$ , 0.2g  $\text{CaCl}_2$ , 0.2g  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ , 0.2g  $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ , 0.2g  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  gave the maximum production of laccase enzyme when pH of fermentation medium was 6.0 at  $35^\circ\text{C}$  was incubated for 9 days with all the optimized culture medium ingredients. Laccase enzyme extracted from *R. stolonifer* was purified by precipitating the protein in ammonium sulfate followed by dialysis. Assay of the purified laccase was carried out by using spectrophotometry. The yield of  $0.411 \pm 0.016$  U/ml laccase from *R. stolonifer* proved to be the potential source for upscaling the cost effective and sustainable process. Laccase was applied in decolorization of waste water from textile industry and bio-bleaching of waste paper and pulp from paper industry. 43%, 12.02% and 11.01% decolorization was observed in waste water from textile industry, waste paper and pulp from paper industry respectively.