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Synthetic dye decolourization, textile dye and paper industrial effluent treatment using white rot fungi *Lentines edodes*

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ABSTRACT

The laccase producing fungi *Lentines edodes* was screened for laccase production using various indicator compounds like guaiacol, tannic acid and the polymeric dyes such as Remazol brilliant blue R and Poly R-478. The organism *Lentines edodes* that produce laccase was cultivated on basal medium. Potato dextrose agar medium (PDA) and malt extract agar medium (MEA) were used for the first subculture of chosen isolate and the plates were examined by light microscopy to check the absence of bacteria and the unique fungi isolation. For testing the crude enzyme laccase activity an agar plug (1 cm^2) from a 7-day old *Lentines edodes* agar plate was transferred to 50 ml of potato dextrose broth in Erlenmeyer flasks. The cultures were maintained at 25°C for 7 days. Screening was performed in Petri dishes (60 mm diameter) with 15 ml of malt extract agar (MEA) medium and potato dextrose agar (PDA) medium from Hi media, Mumbai, India, containing indicator compounds such as 0.04% (w/v) of Remazol Brilliant Blue-R (RBBR) and Poly R-478, 0.01% (v/v) of guaiacol and tannic acid 0.05% (w/v). Guaiacol (Sigma) RBBR (Sigma) and Poly R-478 (Sigma) were added to the media after autoclaving as sterile-filtered solutions. Tannic acid (Merck Chemicals Ltd., UK) was autoclaved separately before addition to the media. Guaiacol is a sensitive substrate that allows a rapid screening of fungal strains producing extracellular guaiacol oxidizing enzymes by means of a colour reaction. The white-rot fungus *Trametes hirsuta* that produces laccase, manganese peroxidase and lignin peroxidase was used as a positive control. The identity of laccase producing fungal species was confirmed by brown color development surrounding the fungal growth. Any colony produce yellow or which causes decolourization of Poly R-478 was considered as ligninolytic positive and isolated. Decolourization of Poly R 478, RBBR, guaiacol and tannic acid oxidizing strains were also studied on liquid cultures for lignin peroxidase, manganese peroxidase and laccase activities. For laccase activity, the isolated fungi was grown at 25°C for 12 days with rotary shaking (150 rpm) in 500-ml baffled Erlenmeyer flasks containing 50 ml of potato dextrose broth. The crude extract of *Lentines edodes* revealed promising results on decolourization of various dye stuffs, paper and textile effluents. About 74.1% of reactive yellow, 77.5% reactive blue and 75% RBBR dye stuffs were effectively decolorized on the third day. Similarly, more than 90% of textile and paper effluents were decolorized on first day itself.

Keywords: Laccase; RBBR; Decolourization; Effluents

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