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Bioprospecting and characterization of laccase producing bacteria from paddy fields of Himachal Pradesh

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Laccase is a copper containing polyphenol oxidase that acts on a wide range of substrates, and thus used in several industrial and biotechnological applications. This enzyme is found in many plant species and is widely distributed in fungi and mostly fungal laccases are used in biotechnological applications. In contrast, little is known about bacterial laccases, although bioinformatic analysis revealed high diversity of bacterial genes for laccase like enzyme and suggests that the enzymes are widespread in bacteria. Since bacterial genetic tools and biotechnological processes are well established, developing bacterial laccases would be significantly important. Thus in the present study, significant high diversity of laccase producing bacteria from rhizosphere of rice plants from paddy fields of Himachal Pradesh was assessed. A total of 375 bacteria were isolated using Tryptone Yeast agar medium containing 5 mM guaiacol as substrate and 40 mg/L $CuSO_4$. Secondary screening for laccase activity based on their ability to oxidise tannic acid and laccase specific substrate dimethoxyphenol led to selection of 51 bacterial isolates. On the basis of morphological and biochemical characterization and laccase activity, nine bacterial isolates exhibiting maximum laccase activity were selected and molecular characterization was carried out using 16S *r*RNA gene technology. *In silico* analysis of 16S *r*RNA sequences identified these bacterial isolates as *Pseudomonas* and *Lysinibacillus* sp.

Keywords: 16S rRNA gene technology, Dimethoxyphenol, Green catalyst, Guaiacol, *Lysinibacillus*, *Pseudomonas*