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Low-cost media composition for increased laccase activity of wood decay fungi, *Phlebiopsis flavidoalba* and *Perenniporia tephropora*

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Laccase, a versatile enzyme with broad substrate specificity, has been extensively researched for over 30 years due to its diverse biotechnological applications. Among diverse types of laccases, white-rot fungal laccases are unique in that they have broad substrate specificities and hence have various biotechnological applications such as dye decolorization, lignin degradation, and polyethylene degradation. It is crucial to achieve high yield while utilizing low-cost raw materials to enable the effective utilization of laccases in commercial and industrial applications. The objective of the current study was to optimize a culture media with low-cost carbon sources for high laccase activities of two laccase-producing fungal species, *Phlebiopsis flavidoalba* and *Perenniporia tephropora*. Fungi were cultured in Potato Dextrose Broth (PDB) while systematically varying one factor at a time for a duration of 21 days, and laccase activities were subsequently determined through spectrophotometric analysis. The effect of carbon sources, and varying concentrations of nitrogen source and copper ion concentrations were assessed on laccase activities. Rice husk, coconut coir fibers, peanut shells, and rubber wood chips were used as carbon sources. The amount of yeast varied from 0.5% to 2% (w/v), $CuSO_4$ concentration varied from 1 $mmolL^{-1}$ to 2 $mmolL^{-1}$ as nitrogen and metal ion concentrations respectively. Among different carbon sources tested, rice husks exhibited the highest laccase activity with 5.560±0.023 fold increase compared to the control followed by peanut shells that had 3.624±0.320 fold increase for *P. flavidoalba*. For the same species, 1% yeast (w/v) and 1.5 $mmolL^{-1}$ of $CuSO_4$ demonstrated the maximum laccase activity. However, in *P. tephropora*, neither yeast concentrations nor copper ion concentrations significantly influenced laccase activity compared to the control. Nonetheless, rice husks exhibited the highest laccase activity displaying 2.120±0.012 fold increase compared to the control followed by peanut shells that had 1.074±0.301 fold increase for *P. tephropora*. To the best of our knowledge, this is the first study to explore the optimization of laccase activity using lignocellulosic waste in *P. flavidoalba* and *P. tephropora.* Sri Lanka being an agricultural country, this research sheds light on the effective utilization of one of the main agricultural waste, rice husks in the industrial scale of laccase production.

Key words: Copper, Laccase, Optimization, Rice husks, Yeast