عنوان مقاله:

Improvement of laccase production by the Co-culture Pleurotus florida and Rhodotorula mucilaginosa in submerged fermentation culture

محل انتشار:

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خلاصه مقاله:

Introduction: Extracellular laccases are constitutively formed in fungi, particularly from basidiomycetes, during secondary metabolism. However, the enzymes are produced in relatively small amounts. Due to their wide application, the productivity improvement process of laccase is important for potential industrial applications. Interspecific interaction of lignolytic fungi with other fungi or bacteria is a technique to improve the production of laccase in a liquid state.Materials and Methods: In this research, the interspecific interaction of a yeast, Rhodotorula mucilaginosa, with white-rot fungi, Pleurotus florida, was evaluated in submerged fermentation using potato dextrose broth. The yeast cells at ۱۰۳, ۱۰۵, and ۱۰۷ CFU mL-۱ concentrations were added into ۱-, ۳-, ۵- and ۸-day cultures of P. florida. To investigate the effect of temperature on R. mucilaginosa cells or its metabolites for laccase enhancement, yeast cells were exposed to different temperatures (۱ h), including room temperature (control), ۷۰ °C, and ۱۲۱ °C (autoclaved). Then, ۳% of the suspension (v/v) was added to the P. florida culture. The laccase activity was assessed by the colorimetric method at ۴۳۶ nm.Results: The results showed that, in comparison to control, the laccase activity was enhanced ۴.۵ times during P. florida yeast interactions in potato dextrose broth medium. Production of the enzyme was significantly affected by the yeast cell concentration and the inoculation time of R. mucilaginosa in the co-culture of P. florida. Maximum enzyme production was achieved when the ۵-day P. florida culture inoculated with ۱۰۵ CFU mL-۱ of R. mucilaginosa. The addition of autoclaved (۱۲۱ °C) yeast cells to P. florida culture did not significantly increase laccase production as compared to control (monocultures of P. florida), although the lowest sterilization temperature (۷۰ °C) had a stimulatory effect on laccase production.Discussion and Conclusion: The results of the study showed the capability of yeast to increase the laccase production by P. florida in dual cultures. The responses of the laccase production could be affected by the inoculation time (after P. florida cultivation) and R. mucilaginosa cell concentration. The interactions needed the live stimulator cells and the stimulatory compounds were temperature-sensitive.

کلمات کلیدی:

Co-cultivation, Culture Extract, white-rot mushroom, laccase, Yeast