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Approaches for stimulating white rot fungi to accumulate bioactive polyphenols and flavonoids

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Polyphenols particularly flavonoids are important secondary metabolites from the medicinal mushroom *Inonotus obliquus*. Both the rarity of *I. obliquus* (white-rot fungus) fruit body and the low efficiency of current method of submerged fermentation lead to a low yield of polyphenols. *I. obliquus* grown in submerged culture could produce anti oxidative polyphenols. We developed the lignocellulose degradation and stimulatory agent-based approaches for enhancing the simultaneous accumulation of *I. obliquus* exo-polyphenols (EPC) and endo-polyphenols (IPC). Lignocellulose degradation increased the production and antioxidant activity of extra- (EPC) and intra-cellular (IPC) phenolic compounds. The production of EPC and IPC was significantly enhanced by wheat straw, rice straw, corn stover, sugarcane bagasse and peanut shells. Both of the EPC and IPC extracts from the lignocelluloses containing media showed a higher DPPH radical-scavenging activity than those from the control. The highly active polyphenols/flavonoids such as epicatechin-3-gallate (ECG) and epigallocatechin-3-gallate (EGCG) and phelligridin G significantly increased. Davallialactone and inoscavin B in the EPC extracts were generated in large amounts in the lignocellulose media but not found in the control medium. Linoleic acid was the most effective out of the 17 tested stimulatory agents, the majority of which increased the EPC and IPC production. The addition of linoleic acid resulted in 7, 14 and 10-fold of increase ($p<0.05$) in the production of EA-EPC (EPC extracted by ethyl acetate), NB-EPC (EPC extracted by n-butyl alcohol) and IPC and significantly increased the production of ferulic acid, gallic acid, ECG, EGCG, phelligridin G, inoscavin B and davallialactone. The EA-EPC, BA-EPC and IPC from the linoleic acid-containing medium had significantly ($p<0.05$) stronger scavenging activity against DPPH radicals which was attributed to the higher content of these bioactive polyphenols and flavonoids. The combination effect of lignocellulose degradation and stimulatory agents was evident.

Biography

Xiangqun Xu received the BSc degree in Biochemistry from Xiamen University, Xiamen, China, MSc degree in Biochemistry from Zhejiang Medical University, Hangzhou, China, and PhD degree in Biomedical Engineering from Keele University, Keele, UK. She was engaged in Postdoctoral training in Biomedicine in Institute of Biotechnology, Cranfield University, UK. She is currently a Professor in Biotechnology and Biochemical Engineering at Zhejiang Sci-Tech University, Hangzhou. Her current research interests include secondary metabolism of microorganisms and plants, natural products, medicinal mushroom polysaccharides and polyphenols/flavonoids, and medical imaging. She has published more than 50 reputed papers.

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