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Scaled-up production of biomass and bioactive compounds and increased antioxidant enzyme activities in adventitious root cultures of *Polygonum multiflorum* Thunb using an airlift bioreactor

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Polygonum multiflorum Thunb. is an important medicinal plant that synthesizes phenolic compounds. Recently, this plant was screened for the production of pharmacologically active and cosmetic ingredients. In the present study, we identified optimal conditions for adventitious root cultures of these plants to optimize the scale-up of the production of biomass and bioactive compounds. Various parameters, such as inoculum density (3–15 g L-1) and duration of growth (1–7 weeks), were optimized in a 3-L airlift bioreactor. Based on the results of the optimization experiments, large-scale (5 and 20-L) and pilot-scale (500-L) adventitious root culture systems were established. We found that 4 weeks of culture with an inoculum density of 5 g L^{-1} resulted in the highest root dry weight (DW; 13.64 g L-1), and the highest concentration of bioactive compounds (53.87 mg g-1 DW total phenolics and 27.96 mg g-1 DW total flavonoids); thus, these culture conditions were suitable for increasing biomass and bioactive compound concentration. An optimal yield of 4.01 kg dry root biomass was achieved in a 500-L pilot-scale bioreactor. In addition, the potential mechanisms underlying changes in the activities of catalase (CAT), peroxidase (POD) and lipid preroxidation (MDA) were studied. At the same time, low oxidative damage was observed, which could be related to the high levels of bioactive compounds and increased activity of antioxidant enzymes. These results will aid in the improvement of the commercial production of biomass and secondary metabolites of *P. multiflorum* for use in the pharmaceutical and cosmetic industries.

Biography

Thanh-Tam Ho has completed his MS course from DaLat University, Vietnam in 2014. He is going to begin his PhD course, supervised by Prof. So-Young Park in the Horticultural Science Department, Chungbuk National University, Korea.

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