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In vitro induction of polyploidy in roots by colchicine treatment to increase biomass and ginsenoside biosynthesis from adventitious roots of wild ginseng

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Ginseng (*Panax ginseng* C.A. Meyer) is a perennial herb that has been used as herbal remedy in Eastern Asia for thousands of years. The older the root, the higher is its pharmacological value, especially that of 100-year-old wild ginseng, because of the higher concentration of ginsenosides, which are the principal bioactive compounds in *Panax ginseng*. Induction of polyploidy by colchicine treatment is an effective method for genetically increasing the size of cell and enhancing the production of secondary metabolites. Therefore, the aim of this study was to induce polyploidy in adventitious roots by using colchicine to enhance root biomass and ginsenoside content of *Panax ginseng*. Adventitious roots of *Panax ginseng* were treated with colchicine at different concentrations (100, 200 and 300 mg L⁻¹) for various durations (1, 2 and 3 days) to induce polyploidy roots. Thirty-nine octoploid roots and 1 hexadecaploid root were detected by using flow cytometry. In the first selection, the lines of polyploidy roots were screened for biomass after 40 days of *in vitro* culture. As a result, 4 octoploid roots (100-1-2, 100-1-18, 300-1-16 and 300-2-8), with the highest biomass, were selected. In the second selection, the adventitious roots were screened again for ginsenoside content by HPLC analysis. The line '100-1-18', an octoploid, showed the highest ginsenoside content. Ginsenoside productivity of the line was 4.8-fold higher than that of the tetraploid root (control). The polyploid roots described in this study could be used as material to increase the production of *Panax ginseng* biomass and ginsenosides.

Biography

Kim-Cuong Le has completed her MS course in 2013 from Dalat University, Lam Dong, Vietnam. She was a Researcher in the Molecular Biology and Plant Breeding department of Tay Nguyen Institute for Scientific Research, Vietnam for a year. Currently, she is a PhD candidate in the Department of Horticulture Science of Chungbuk National University in Korea.

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