

Response of colchicine for the efficient chromosome doubling in *Codonopsis lanceolata*

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Abstract

Polyploidy has opened a new horizon for selection to sculpt a variety of new gene functions, traits, and lineages. The aim of this study was to investigate the efficacy of the colchicine concentration, temporal changes, and suitable material for inducing effective tetraploid plants of *Codonopsis lanceolata*. A total of 180 individuals from 16 treatment groups were germinated, and exposed to different concentrations of Colchicine. The plant height of the diploid (18.1 cm) was slightly shorter than that of the tetraploid (13.4 cm). The fresh weight of the main root in the diploid (0.5 g) was 4-fold higher than the tetraploid (2.2 g). The colchicine-treated plant regeneration rate in *C. lanceolata* was decreased at the elevated concentration of colchicine. A total of 126 individual plants were regenerated in the entire treatment group and tetraploid ($2n=4x=32$) plants were obtained. In particular, 5 individuals of the tetraploid plant were induced in the 0.05% colchicine for 6h, which is a higher rate (29.4%) than other regenerated plants. As in the seed treatment result, the plant height of the diploid was significantly higher (10.4 cm) than tetraploid. The root length of the tetraploid (10.1 cm) was longer than the diploid, and the root was also thicker. Taken together, the results obtained from the present study may be helpful for the efficient recovery of such polyploid plants through the in vitro application of colchicine, and may improve the productivity and breeding of *C. lanceolata*.

Keywords: *Codonopsis lanceolata*, concentration, plant regeneration, tetraploid

Acknowledgements: This work was supported by Korea Institute of Planning and Evaluation for Technology in Food, Agriculture, Forestry and Fisheries (IPET) through High Value-added Food Technology Development Program, funded by Ministry of Agriculture, Food and Rural Affairs(MAFRA)(114036-04-3-HD030)

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