

Optimal culture conditions for mass production of rock polypody (*Polypodium vulgare* L.)

Bo Kook Jang¹), Kyungtae Park¹), Ahreum Han³), and Cheol Hee Lee²)*

1)Graduated Student, and 2)Professor, Brain Korea 21 Center for Bio-Resource Development, Division of Animal, Horticultural and Food Sciences, Chungbuk National University, Cheongju, 28644, Republic of Korea, 3)Senior Researcher, Jeil Seed Bio, Jeungpyeong, 27906, Republic of Korea

ABSTRACT

This study aimed to develop a suitable method for inducing the proliferation of prothallus and producing sporophytes of rock polypody (*Polypodium vulgare* L.). The prothalli used in all experiments were obtained from spore germination and sub-cultured for 8-week intervals. The most appropriate media for prothallus propagation were investigated by culturing 300 mg of prothallus in MS (1/4×, 1/2×, 1×, and 2× strength) medium and in Knop medium for 8 weeks. Cultures were maintained at a temperature of $25 \pm 1^\circ\text{C}$, light intensity of $30 \pm 1.0 \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$, and a photoperiod of 16/8 h (light/dark). Fresh weight of prothalli was 4.8 g on 1× MS, 4.5 g on 1/2× MS and 4.3 g on 1/4 MS medium. To select a suitable soil combination for sporophyte formation, 1.0 g of prothallus was ground with distilled water, spread in five combinations onto different soil substrates (decomposed granite, horticultural substrates, peat moss, and perlite), and then cultivated for 13 weeks. The sporophyte cultures were maintained at a temperature of $25 \pm 1^\circ\text{C}$, light intensity of $43 \pm 2.0 \mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$, humidity of $84 \pm 1.4\%$, and a photoperiod of 16/8 h (light/dark). The results showed that a mixture containing a 2:1 (v:v) ratio of horticultural substrate and perlite, increased sporophyte formation to 462.5 sporophytes per pot (7.5 cm²). The other soil substrates produced from 314.5 to 405.3 sporophytes per pot. Therefore, our results will provide conditions suitable for mass production of *Polypodium vulgare* L.

Keywords: fern mass propagation, gametophyte, Mi-yeok-go-sa-ri, ornamental fern, sporophyte

*(Corresponding author) E-mail: leech@chungbuk.ac.kr Tel: +82-43-261-2526

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