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In Vitro Germination of Encapsulated Somatic Embryos of Angelica Tree(*Aralia elata* Seem.)

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두릅나무 피복체세포배의 기내발아

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Abstract

Germination rate of encapsulated somatic embryos showed significant differences under different concentrations of $AgNO_3$. The highest germination rate of 81.2% was found on MS medium without hormones mixed with 10 mg/l of $AgNO_3$. *In vitro* vermiculite planted with encapsulated embryos treated with 10 mg/l of $AgNO_3$ induced 24.7% germination rate, and vermiculite planted with encapsulated embryos treated with 40 mg/l or 80 mg/l of $AgNO_3$ induced no germination at all.

Key words : *Aralia elata*, Somatic embryos, Encapsulation

Introduction

Various parts of angelica trees are useful not only for medicainal purposes but also for other purposes such as steamed vegetables and other side dishes for rice eating Koreans. As the demand for angelica tree products at home and restaurants is increasing, effective cultivation methods are required while preserving the natural habaitats. Conventionally, propagation of this tree, from which the young buds for cooking were collected, was possible through root cutting method (7). In recent years plantlet productions were possible through tissue cultures (2, 3, 4). However, even with tissue curture method, it takes 2 to 3 years to mature in the field during which pathogens and insects can reduce the quality and quantity of the angelica tree products. Therefore, it is necessary to develop a technique for better growth of plantlets. The main purpose for this study was to develop a technique to improve the survival rate during acclimation and to promote early growth through alginate matrix coating of somatic embryos.

Materials and Methods

Embryogenic calli from young leaves of angelica trees were sieved through 60 mesh sieve. Sieved calli were used for suspension culture in 100ml flask containing 20ml of basic medium and 3ml(0.01g)of sieved calli.

Suspensions were agitated at 100 rpm and subcultured every seven days. $AgNO_3$ was prepared in 1/2 MS medium (6). Mature somatic embryos of 5-6mm in length were mixed with alginate matrix prepared, and 0.2ml of alginate and embryo mix-

tures were pipetted onto 50mM $CaCl_2$ solution and allowed to solidify in capsule form for ten minutes. Encapsulated somatic embryos were washed with distilled water twice and germination test was performed. For germination tests, direct sowing of somatic embryos were performed on MS medium without hormones and on sterilized vermiculite in petridish. Germination rates on MS medium without hormones and on sterilized vermiculite were evaluated in 2 and 4 weeks, respectively.

Results and Discussion

Germination rate of encapsulated somatic embryos showed significant differences under different concentrations of $AgNO_3$. The highest germination rate of 81.2% was found on MS medium without hormones mixed with 10 mg/l of $AgNO_3$. There were low germination rates or no germinations at 40 mg/l or more of $AgNO_3$. Encapsulation with no $AgNO_3$ and 1/2 concentration of MS resulted in germination rates of 19.4%. Significantly low germination were observed on vermiculite compared to those observed on MS medium. Vermiculite planted with encapsulated embryos treated with 10 mg/l of $AgNO_3$ induced 24.7% germination rate, and vermiculite planted with encapsulated embryos treated with 40 mg/l or 80 mg/l of $AgNO_3$ induced no germination at all. Vermiculite planted with encapsulated embryos with no $AgNO_3$ added showed 1.2% germination rate. Germination rates on vermiculite under differemt concentration of $AgNO_3$ showed similar trend as those observed on MS medium without hormones. Low germination rates in genereal might have caused by Ca-alginate with low O_2 obsorption capacity (5) as well as contamination (2), and by pipetting which resulted in low uniformity in size and malformation of capsules. Therefore, low germination rates in *in vitro* conditions showed lack of practicality for encapsulation of plantlets during the acclimation and early growth. Further studies for the development of coating materials to increase the O_2 uptake and to increase the survival rate under dry conditions would be necessary.

적 요

본 연구는 조직배양된 두릅나무 체세포배의 순화시 생존율을 증대시키고 체세포배를 alginate

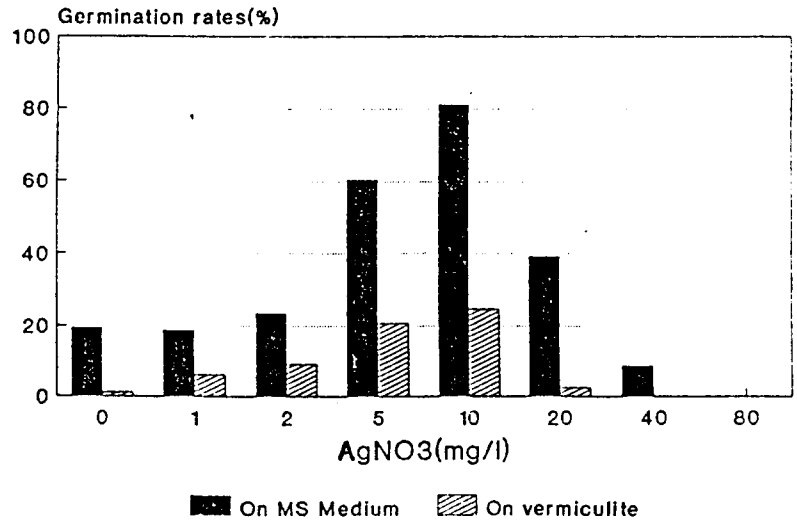

Figure 1. *In vitro* germination of encapsulated somatic embryos.

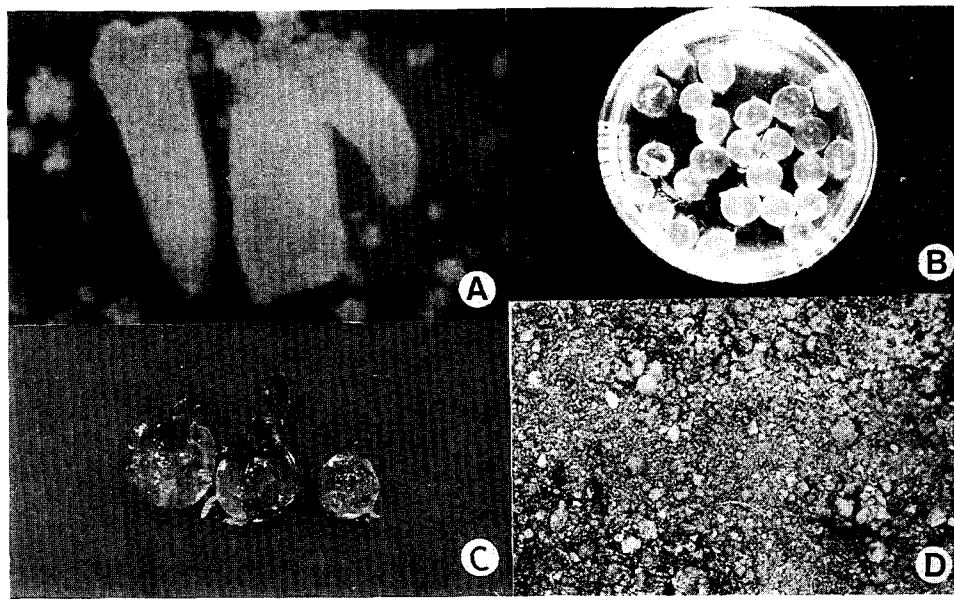

Figure 2. *In vitro* and germination of encapsulated somatic embryos of *Aralia elata* S. A. Somatic embryos in suspension culture of *A. elata* callus. B. Somatic embryos encapsulated with alginate matrix. C. Germination of encapsulated somatic embryos sowed on vermiculite. D. Plantlets from encapsulated somatic embryos growing on soil-vermiculite mixture.

matrix로 피복하여 초기생장을 촉진시킬 수 있는 방법을 개발하기 위하여 수행되었다. 그 결과 피복재료에 첨가된 $AgNO_3$ 농도에 따라 피복체세포배의 발아율에 차이가 있었으며, 10 mg/l의 $AgNO_3$가 첨가된 피복체세포배가 호르몬을 첨가하지 않은 MS 배지에서 가장높은 발아율 (81.2%)을 나타냈다. 10 mg/l의 $AgNO_3$가 첨가된 피복체세포배가 기내 vermiculite에서는 24.7%의 발아율을 나타냈으며, 40 mg/l 혹은 80 mg/l의 $AgNO_3$가 첨가된 피복체세포배는 기내 vermiculite에서 전혀 발아하지 않았다.

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