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Combined Effects of Ethylene and Methyl Jasmonate on Adventitious Root Growth and Ginsenoside Production in Two-stage Bioreactor Cultures of *Panax ginseng*

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Objectives

Ethylene and methyl jasmonate (MJ) were the major signal transducers in plant. These chemicals are produced in response to wounding and sometimes stimulated secondary metabolites in plant cell and tissue cultures. In ginseng adventitious root (GAR) culture, two chemicals were effective for ginsenoside production, separately. In this work, combined effects of ethylene and MJ were investigated to increase ginsenoside productivity.

Materials and Methods

1. Material

Plant – Adventitious roots induced from *Panax ginseng* C.A. Meyer.

2. Methods:

GAR (10 g fresh wt) harvested after 40 days in 5 L airlift bioreactor were cultured in 300 mL Erlenmeyer flask containing 100 mL MS (without NH_4NO_3) liquid media with 10, 50 and 100 μM ethephon for 7 days, respectively. For combined effects in ginsenoside production, 100 μM MJ was treated in three different media described above. All flasks were shaken to 110 rpm in darkness of $23 \pm 1^\circ\text{C}$. Ginsenosides were analyzed by HPLC with UV detector and ethylene was analyzed by GC with FID detector.

Results and Discussion

Ethylene was produced by ethephon treated in flasks. This produced ethylene affected to growth and ginsenoside production of GAR. Ethylene produced by MJ was also affected to ginsenoside production. Ginsenoside production was more increased in combined treatment with 50 μM ethephon and 100 μM MJ. In addition, ginsenoside production in combined treatment (29.93 mg/g dry wt) was maximized at 2 days while in single treatment of 100 μM MJ (19.27 mg/g dry wt) was maximized at 8 days.