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

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### Objectives

In previous study on ginseng adventitious root (GAR), we reported that methyl jasmonate (MJ) increased ginsenoside production. As a series of MJ treatment, this study has been tried to more increase ginsenoside accumulation in GAR using 'double stresses' treatment of MJ treatment and medium starvation.

### Materials and Methods

#### 1. Material

Plant – Adventitious roots induced from *Panax ginseng* C.A. Meyer (6 years old).

#### 2. Methods:

To increase ginsenoside production, GAR (30 g fresh wt) harvested after 40 days in 5 L airlift bioreactor were cultured in 1 L Erlenmeyer flask containing three different 300 mL MS (without NH<sub>4</sub>NO<sub>3</sub>) liquid media (distilled water, conditioned medium and fresh medium) for 7 days, respectively. For synergistic (=double) effects, 100 μM MJ was treated in three different media described above. All flasks were shaken to 110 rpm in darkness of 23±1°C. Ginsenosides were analyzed by HPLC.

### Results and Discussion

In distilled water medium, dry weight of GAR decreased about 47% (1.83 g dry wt) compared to fresh medium (3.43 g dry wt). Meanwhile, ginsenoside content significantly increased in distilled water medium (11.40 mg/g dry wt) compared to conditioned medium (6.00 mg/g dry wt) and fresh medium (4.63 mg/g dry wt). Ginsenoside productivity also highly increased in distilled water medium. However, 100 μM MJ treated in distilled water medium severely decreased dry weight and ginsenoside accumulation compared to other media. The 100 μM MJ in conditioned medium was the most effective for more ginsenoside productivity. In last, we were investigated to a synergistic effect using MJ and conditioned medium with major medium components. This trial showed the best results in ginsenoside productivity.