

## Molecular Characterization of MVA pathway genes in *Platycodon grandiflorum* A.

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### Objectives

Platycodi Radix is the root of *Platycodon grandiflorum* A. (Campanulaceae). It is a famous medicinal plants in northern China and Korea. It has been used as food additive and in traditional oriental medicines as a treat coughs, colds, upper respiratory tract infections, sorethroats, tonsillitis, and chest congestion. (Lee, 1973; Kim et al., 1995). MVA pathway is first step of triterpene biosynthesis. Here we were discovered expression pattern of 4 genes (HMGS, HMGR, MK, MVD) in different organs and response of stress.

### Materials and Methods

○Preparation and use of elicitors

Hairy root of *platycodon glandiflorum* was grown in half MS medium and subcultured every 4 weeks. Methyl jasmonate was first dissolved in 100% EtOH at optimal concentration. 100uM elicitor solutions were added to the culture medium and tested time course 3, 6, 12, 24, 48hrs. Wounding of hairy root was repeatedly cutting with a sharp scalpel. The root were collected by vacuum filtration and stored at- 80. Each treatment were consisted of three flask and the experiment was repeated three times.

○RNA extraction and cDNA synthesis

○Real time PCR analysis

○Saponins extraction HPLC analysis

### Results

○Tissue specific expression in balloon flower

To analysis the expression of MVA pathway genes, we designed gene-specific primers of each genes and performed qRT-PCR. In order to investigate the each gene expression pattern in different organs of balloon flower plant, total RNA was extracted from root, stem, leaf, flower, respectively, and transcribed cDNA used superscriptII single strand cDNA synthesis kit (invitrogen, USA). As shown in

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Fig. 1, all genes were differently expressed in organs and highly expressed in leaf, except HMGR.

○Endogenous saponin analysis

To investigate tissue specific accumulation of triterpene saponins, plant was separated four part such as flower, leaf, stem and root. Here 4 kind of triterpene saponin were used; Diapio-platycoside E, Platycoside E, Platycodin D3, Platyconic acid. As previous reports, all saponins was detected in root and same results with ours. However, platyconic acid was detected all organs and Platycodin D3 was also accumulated in leaf.

○Inducible expression of MVA pathway genes

MeJA treatment and wounding were caused the rapid induction of MVA pathway genes. It was demonstrated that the expression of all terpene biosynthetic genes could be induced by MeJA. This result suggests that MeJA treatment might be an effective approach to induce gene expression in hairy root.

\*시험성적

Table 1. Triterpene glycoside contents in different organs

mg/g	Diapio-platycoside E	Platycoside E	Platycodin D3	Platyconic acid
Flower	-	-	-	0.43 ±0.03
Leaf	-	-	0.33 ±0.01	0.43 ±0.02
Stem	-	-	-	0.22 ±0.03
Root	1.28±0.28	1.03 ±0.16	0.22 ±0.01	0.36 ±0.04

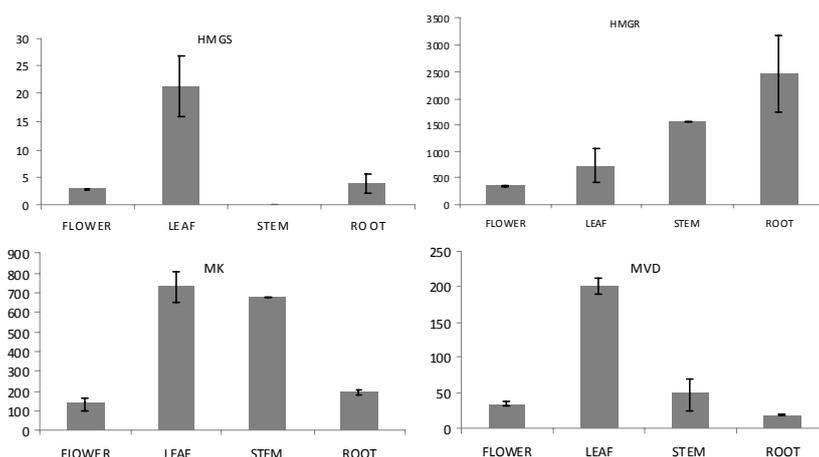


Fig 1. Gene expression of various organs

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