

**Rapid Authentication of Korean Ginseng (*panax ginseng* C. A. Meyer)  
by SNP genotyping with real-time PCR**

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### **Objectives**

Recently, Korean ginseng cultivars are frequently mixed-cultivated in farmhouses, and the seeds of Korean ginseng cultivars are sold in the market by home seed production. These illegal practices have caused serious social problem, such as breeders' IPR(intellectual property rights) in ginseng quality and monetary damage of farmers caused by using mixed seeds. Therefore, an effective management system for maintaining the high quality of Korean ginsengcultivars should be established.

### **Material and Methods**

○ Preparation of samples

Korean ginseng cultivars; Chunpoong, Yunpoong, Gopoong, Kumpoong, Sunpoong

○ TaqMan<sup>®</sup>-MGB probe and primer design

TaqMan<sup>®</sup>-MGB probe sets were designed on the basis of SNP site detected in sequence of amplified region by UFGp74, MFGp110A and MFGp130A primers (Lee,2010).

○ Real-time polymerase chain reaction

Real-time PCR was performed by amplification using the ABI Step One Plus system (Applied Biosystems, Foster city, CA, USA). The reaction conditions were as follows: 60 °C for 30 sec, 95 °C for 10min followed by 40 cycles of 95 °C for 15 s and 60 °C for 1min.

○ Genotyping analysis

For scatter plot analysis, the automatically generated threshold cycle values from each sample were plotted at coordinates that correspond to the signal of either FAM or VIC.

## Results

Two genotypes (allele A or G) were detected in UFGp74. Chunpoong and Sunpoong shared same allele-A, and Yunpoong, Gopoong and Kumpoong share another same allele-G. In the case of MFGp110A, two genotypes (allele T or C) were detected in the five cultivars of Korean ginseng. Chunpoong and Gopoong shared same allele-T, whereas Yunpoong, Kumpoong and Sunpoong shared another same allele-C. Lastly, two genotypes (allele A or C) of MFGp130A in the five cultivars of Korean ginseng have been identified. Chunpoong, Gopoong and Kumpoong shared same allele-A, whereas Yunpoong and Sunpoong shared another same allele-C. As a consequence, allele combination of probes (UFGp74, MFGp110A and MFGp130A) could distinguish clearly the five cultivars of Korean ginseng. Allele-combinations of each cultivar is shown in Table 1.

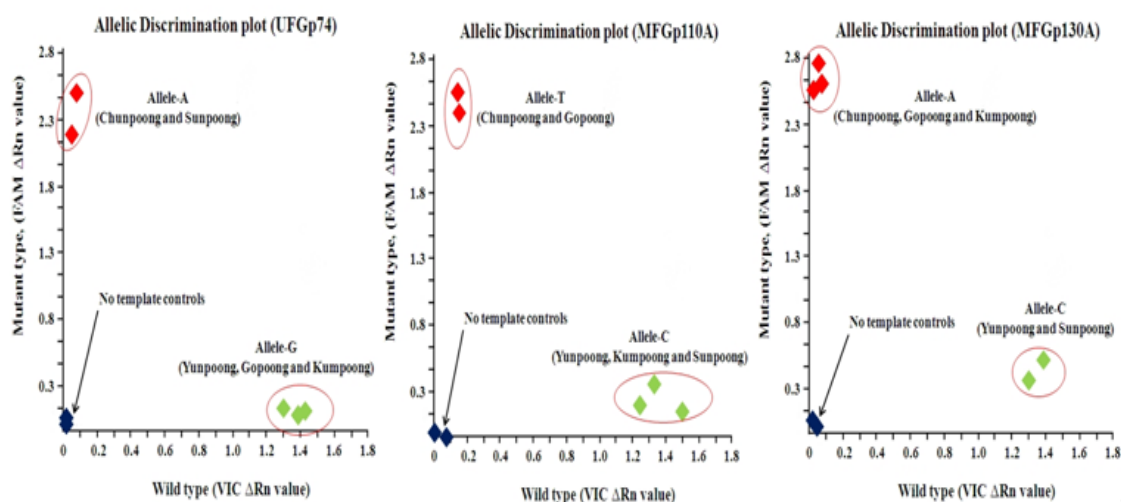


Fig. 1. Application of the TaqMan® MGB probe pairs (UFGp74, MFGp110A and MFGp130A) in distinguishing from the five cultivars of Korean ginseng.

Table 1. Allele-combinations of Korean ginseng cultivars by SNP genotyping.

Probe	Cultivars / allele type				
	Chunpoong	Yunpoong	Gopoong	Kumpoong	Sunpoong
UFGp74	A	G	G	G	A
MFGp110A	T	C	T	C	C
MFGp130A	A	C	A	A	C
Allele combination	ATA	GCC	GTA	GCA	ACC