I -34

Molecular authentication of Korean ginseng cultivars (Panax ginseng C. A. Meyer) by inter simple sequence repeat (ISSR) markers

ISSR 마커를 활용한 고려인삼 품종의 분자적 입증

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Objectives

The genus *Panax* (Araliaceae family) consists of more than 10 species which are mostly famous and important medicinal plants. Among them, ginseng (*Panax ginseng* C.A Mayer) is a most valuable medicinal root crop. Recently, new Korean ginseng cultivars have been developed, which have superior agricultural traits. For newly developed plant cultivars, the identification of distinctiveness is a very important factor not only in plant cultivar management, including cultivar protection and registration, but also in breeding programs. Thus, we tested a significant number of ISSR primers to six major Korean ginseng cultivars to detect polymorphisms for identification of Korean ginseng cultivars and discrimination of them from other *Panax* species such as *P. quinquefolius* and *P. notoginseng*.

Materials and Methods

1. Korean ginseng cultivars : Chunpoong, Yunpoong, Gopoong, Kumpoong, Sunpoong, and Sunwon
2. Foreign ginseng : American ginseng (*P. quinquefolius*)
   Chinese ginseng (*P. notoginseng*)
3. PCR primers : 85 ISSR primers (University of British Columbia, Canada)
4. ISSR PCR : Total 30μl reaction volume, 10ng of DNA template, 30 pmole of single pair primer, 2.5 mM of MgCl2, 0.25 mM of dNTPs, and 1U of Taq polymerase
5. PCR condition : Initial denaturation at 95°C for 3 min, followed by 35 cycles of amplification at 95°C for 30 sec, annealing at either of 55°C, 50°C or 45°C, extension at 72°C for 1 min and a final last extension at 72 ºC for 5 min.

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Results

A total of 197 polymorphic bands with an average 5.8 polymorphic bands and 2.9 banding patterns per assay unit across six Korean ginseng cultivars and foreign ginsengs from 236 amplified ISSR loci with an average 6.9 loci per assay unit were generated by thirty-four out of 85 ISSR primers. Three species of *P. ginseng* including the Korean ginseng cultivars, *P. quinquefolius,* and *P. notoginseng*, could be readily discriminated using most tested primers. UBC-821, UBC-868, and UBC-878 specifically generated polymorphic bands among the six Korean ginseng cultivars, and could distinguish them from foreign ginsengs.

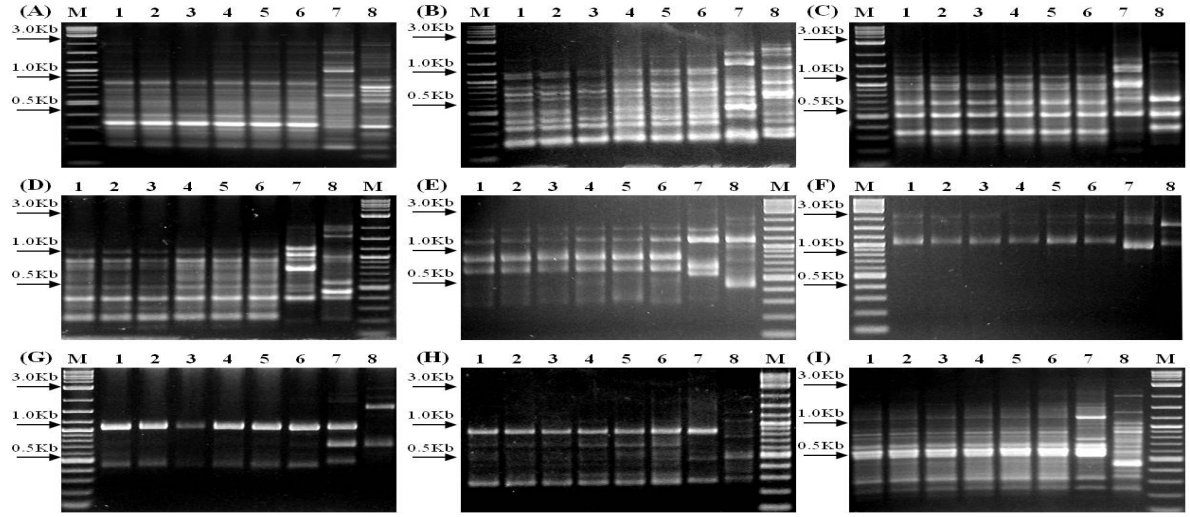

Fig. 1 Polymorphisms by the ISSR primers beteewn Korean ginseng cultivars and foreign ginseng. lane 1, Chunpoong; lane 2, Yunpoongg; lane 3, Gopoong; lane 4, Kumpoong; lane 5, Sunpoong; lane 6, Sunwon; lane 7, *P. quinquefolius*; lane 8, *P. notoginseng*. (A) UBC-808, (B) UBC-809 (C) UBC-834, (D) UBC-840, (E) UBC-843, (F) UBC-852, (G) UBC-853, (H) UBC-872 and (I) UBC-880.

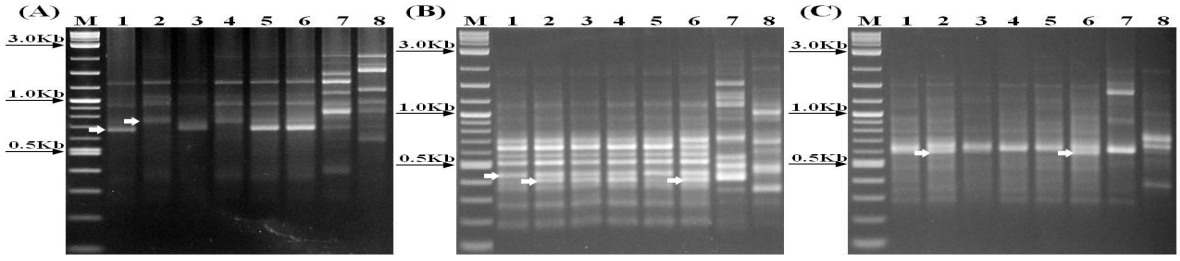

Fig. 2 Polymorphism by the ISSR primers among six Korean ginseng cultivars, P. quinquefolius, and P. notoginseng, lane 1, Chunpoong; lane 2, Yunpoongg; lane 3, Gopoong; lane 4, Kumpoong; lane 5, Sunpoong; lane 6, Sunwon; lane 7, P. quinquefolius; lane 8, P. notoginseng. (A) UBC-821, (B) UBC-868, and (C) UBC-878.