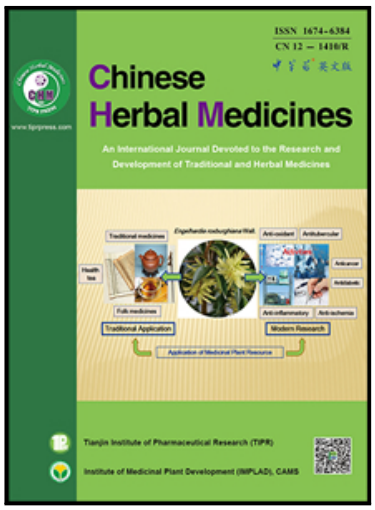

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Identification and quality analysis of *Panax notoginseng* and *Panax vietnamensis* var. *fuscidicus* through integrated DNA barcoding and HPLC

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Abstract

Objective: Root or rhizome of *Panax notoginseng* (*Sanqi*) is known for its eutherapeutic effects. *Panax vietnamensis* var. *fuscidicus,* called *Yesanqi* or *Yuenan sanqi* by local residents, is also commercially available. They are similar in morphology, leading to serious safety problems in clinical medication. It is necessary to find the rapid and efficient methods to identify them. **Methods:** *P. notoginseng* and *P. vietnamensis* var. *fuscidicus* were identified by DNA barcoding based on the ITS2 sequence. Notoginsenoside R1 and ginsenosides (Rb1, Rg1, Re, Rd, Rc, and Rb2) were analyzed in the roots, fibrils, stems, leaves, and flowers of *P. notoginseng* and *P. vietnamensis* var. *fuscidicus* using high-performance liquid chromatography (HPLC). **Results** *P. notoginseng* and *P. vietnamensis* var. *fuscidicus* were separated into branches of divergent clusters, and *P. vietnamensis* var. *fuscidicus* and *Panax vietnamensis* were clustered into a clade with 98% similarity according to DNA barcoding analysis. The chemical compositions of *P. notoginseng* and *P. vietnamensis* var. *fuscidicus* were similar in roots; while their compositions and contents of the notoginsenoside R1 and ginsenosides in flowers, leaves, stems, and fibrils were different. **Conclusion** ITS2 is a rapid and efficient method to identify *P. notoginseng* and *P. vietnamensis* var. *fuscidicus*. HPLC analysis indicated that pharmacological action might be different between *P. notoginseng* and *P. vietnamensis* var. *fuscidicus*.

Key words: DNA barcoding; HPLC; identification; *Panax notoginseng* (Burk.) F. H. Chen

1. Introduction

Panax notoginseng (Burk.) F. H. Chen (*Sanqi*) is one of the most valuable traditional Chinese herbal medicines with multiple pharmacological activities (Ng, 2006; Pharmacopoeia Committee of P. R. China, 2015; Wang et al, 2006). Its demand and price have been increasing (Cui et al, 2014; World Health Organization. 2008). Thus, some species were commonly used as adulterants because of their similar morphological characteristics (Xin et al, 2015). For example, *Gynura segetum* (Lour.) Merr., *Anredera cordifolia* (Tenore) Steenis, *Curcuma longa* L., and *Mirabilis jalapa* L. were recognized as adulterants of *P. notoginseng* (Cao et al, 2001; Cui et al, 2003; Jiang et al, 2017). However, the application of various counterfeit species threatens the safety and efficacy in clinical medication (Wan, 2016). Recently, root or rhizome of *P. vietnamensis* var. *fuscidicus* Chen Zhongjian (*Yesanqi or Yuenan sanqi*) has become commercially available due to morphologically similar to that of *P. notoginseng*. *P. notoginseng* and *P. vietnamensis* var. *fuscidicus* cannot be easily distinguished from each other by using traditional morphological methods. Therefore, efficient identification and evaluation methods for them should be developed.

DNA barcoding is universal in distinguishing species because it provides easy amplification and exhibits repeatability (Chen et al, 2012, 2014; Hebert et al, 2003). With