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## Phenotypic variation and identification of *Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) in China

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### Abstract

*Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) is an invasive mealybug that seriously damages cotton and other important crops. In previous studies in China, the presence of two submedian longitudinal lines of pigmented spots on the dorsum of adult females frequently has been used to identify this species. However, the present study records the occasional absence of pigmented spots in a sample from Guangxi province, China. Specimens without pigmented spots showed all the molecular and morphological characters that separate *P. solenopsis* from the similar species *P. solani* Ferris, especially the distribution of multilocular disc pores. In different geographic populations of *P. solenopsis* in China, mitochondrial COI and nuclear 28SrDNA genes are very similar (99.8–100%), indicating that they are conspecific. For COI, the genetic distance between *P. solenopsis* and *P. solani* is more than 3%. A map of the distribution of *P. solenopsis* in China is given. To help identify both pigmented and non-pigmented *P. solenopsis* accurately, an identification key to the 16 species of *Phenacoccus* found in China is provided. The key also identifies five potentially invasive *Phenacoccus* species not yet established in China, in case they get introduced there.

**Key words:** appearance in life, COI, 28SrDNA, identification key

### Introduction

*Phenacoccus solenopsis* Tinsley (Hemiptera: Pseudococcidae) is an important invasive pest that seriously damages cotton (*Gossypium hirsutum*) and other important crops. It was first reported as a pest of cotton in Texas, USA (Fuchs *et al.*, 1991). This invasive species currently has an almost worldwide distribution (Ben-Dov, 2013a; Wang *et al.*, 2010) spanning the southern USA, the Caribbean Islands, Central and South America (Ben-Dov, 2013a; Williams & Granara de Willink, 1992); Pakistan and India (Abbas *et al.*, 2005; Ben-Dov, 2013a; Hodgson *et al.*, 2008), Indonesia, Thailand and Taiwan (Ben-Dov, 2013a), mainland China (Wu & Zhang, 2009), Japan (Ryukyu Archipelago) (Tanaka & Uesato, 2012), West Africa (Akintola & Ande, 2008), Australia (Muniappan *et al.*, 2011; Queensland Department of Agriculture, Fisheries and Forestry 2013), and Egypt, Iran and Turkey (Kaydan *et al.*, 2013).

Since at least 2005, *P. solenopsis* has been causing serious damage to cotton in Pakistan and India, and it presents a serious threat to cotton in China and other cotton-growing countries (Hodgson *et al.*, 2008; Wang *et al.*, 2009). According to the international pest risk analysis method, *P. solenopsis* is a high-risk invasive species to China with a risk value of 0.886 (Wang *et al.*, 2009), and could establish in most of the 17 provinces of China (Wang *et al.*, 2010). The mealybug was first identified in Guangdong province in 2008 (Wu & Zhang, 2009), and has spread from the southern part of China to the middle and lower parts of the Yangtze River valley. It is already established in most parts of 13 provinces and autonomous regions of China.

*Phenacoccus solenopsis* shows considerable phenotypic variation, both in its appearance in life (or in alcohol) and in its morphology. This presents a challenge for making accurate identification during quarantine inspection.

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