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眼蕈蚊属害虫危害金线莲的首次报道 (英文)

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摘要: 兰科 Orchidaceae 植物金线莲 *Anoectochilus roxburghii* (Wall.) Lindl 是一种在中国广泛使用的中草药。本文首次报道两种迟眼蕈蚊属害虫危害金线莲, 即 *Bradysia impatiens* (Johannsen, 1912) 和 *Bradysia ocellaris* (Comstock, 1882)。这一发现提醒昆虫学家和农民应当注意金线莲和其他兰科植物上的潜在害虫, 具有重要的经济意义。

关键词: 分子鉴定; 温室作物; 草药; 新害虫

中图分类号: Q968.1; S433

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First record of *Bradysia* spp. (Diptera: Sciarioidea) infesting *Anoectochilus roxburghii* (Wall.) Lindl in China

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Abstract: This paper presents the first report of *Bradysia* spp. i. e. *Bradysia impatiens* (Johannsen 1912) and *Bradysia ocellaris* (Comstock, 1882) infesting *Anoectochilus roxburghii* (Wall.) Lindl (Orchidaceae), a widely used traditional medicinal herb in China. This discovery reminds entomologists and farmers to be aware of these potential pests on *A. roxburghii* and other Orchidaceae flowers with great economic importance.

Key words: Molecular identification; greenhouse crops; medicinal herb; new pest

Anoectochilus roxburghii (Wall.) Lindl (Orchidaceae) is a widely used traditional medicinal herb in China (Luo *et al.*, 2018) and also valued in many other countries, such as India, Bangladesh, Nepal, Myanmar, Bhutan, Thailand and Japan, and popular as a ‘jewel orchid’ due to its beautiful

purplish-red to greenish-brown leaves with golden-red reticulations (Bhattacharjee, 2013). *A. roxburghii* has been widely used for medicinal, culinary, and ornamental purposes and is a rich source of vitamins, polysaccharides, alkaloids and organic acids (Ye *et al.*, 2017).

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Bradysia species (Sciaridae: Diptera) are notorious pests of many greenhouse crops and plants (Shin *et al.* , 2013) . Some species of this genus have become the most devastating pests in greenhouses and cause severe economic losses in China (Shen *et al.* , 2008) . Here , this study is the first to document the presence of *Bradysia* species infesting *A. roxburghii* in the world. Therefore , more detailed investigation of *Bradysia* pests on *A. roxburghii* and other Orchidaceae flowers with great economic importance is deserved.

1 Materials and Methods

1.1 Insects collection

Bradysia adults were collected by mouth aspirator in *A. roxburghii* seedling nursery in Longmen , Huizhou City , Guangdong Province , China by the authors. Roots of *A. roxburghii* infested by larvae were taken to the laboratory (Department of Entomology , South China Agricultural University , Guangzhou) and reared to adulthood. *B. impatiens* and *B. ocellaris* adults were identified based on their morphological characteristics by Junhao Huang (Zhejiang A & F University , Hangzhou) .

1.2 Molecular identification

Genome DNA was isolated by using a DNeasy[®] Blood and Tissue Kit (Qiagen , Inc. , Hilden , Germany) . The mtCO1 universal primers LCO1490 and HCO2198 were used for PCR amplification. The TaKaRa Taq[™] (with Mg²⁺ - free buffer) system (Takara Biomedical Technology Co. , Ltd. , Beijing , China) was used for PCR amplification. The following PCR cycles were used for mtCO1 amplification: Incubation at 95°C for 5 min , followed by 35 cycles of 95°C for 30 s , 45°C for 40 s and 72°C for 50 s , and a final extension at 72°C for 10 min. PCR products were electrophoresed in 1.2% agarose to verify the integrity of the fragments. Then , these samples were sent to Sangon Biotech (Shanghai City , China) for sequencing.

We analyzed 658 bp of the mtCO1 sequence. Each sequence was compared with the mitochondrial genomes of other species using the NCBI BLAST (<http://blast.ncbi.nlm.nih.gov/Blast.cgi>) . A phylogenetic tree was generated with MEGA 5.0 software (Tamura *et al.* , 2011) .

2 Results

The individuals from the two samples , *Bradysia* 1 and *Bradysia* 2 , were molecularly identified using their mtCO1 sequences. The sequence analysis results showed that the mtCO1 sequence of *Bradysia* 1 was 100% identical to that of *Bradysia impatiens* (GenBank: JX418035.1) within 96% query coverage (Fig. 1) . The mtCO1 sequence of *Bradysia* 2 was 98.62% identical to that of *Bradysia ocellaris* (GenBank: KY846644.1) with 97% query coverage (Fig. 2) . Thus , the *Bradysia* spp. that infested *A. roxburghii* (Wall.) Lindl in Huizhou , China were *B. impatiens* and *B. ocellaris*.

3 Conclusion and Discussion

The individuals from the two samples collected by mouth aspirator in *A. roxburghii* , *Bradysia* 1 and *Bradysia* 2 were molecularly identified as *Bradysia impatiens* and *Bradysia ocellaris*. *B. impatiens* widely distributed in China and damages mushrooms , shallot , spring onion , lily , garlic , cucumber , melon and several other greenhouse crops and causes severe economic losses in China and worldwide (Gou *et al.* , 2015) . *B. ocellaris* was first recorded from a glasshouse in Tasmania in 1992 (Menzel *et al.* , 2003) , and no detailed records or research on this species can be found from China. In recent years , research on *Bradysia* has focused on the study of its morphological , biological , genetic and molecular characteristics and biochemical control (Zhang *et al.* , 2008; Hurley *et al.* , 2010; Shin *et al.* , 2013) . *A. roxburghii* is a very important medicinal herb in China. It is commercially cultivated in Fujian Province. However , cultivation of , as well as research on , *A. roxburghii* is relatively scarce in Guangdong Province. In recent years , local pharmaceutical companies and some farmers have introduced *A. roxburghii* from Fujian Province. Nevertheless , due to some biotic and abiotic factors , the survival rate of *A. roxburghii* in this province is relatively low (Lin *et al.* , 2018) .

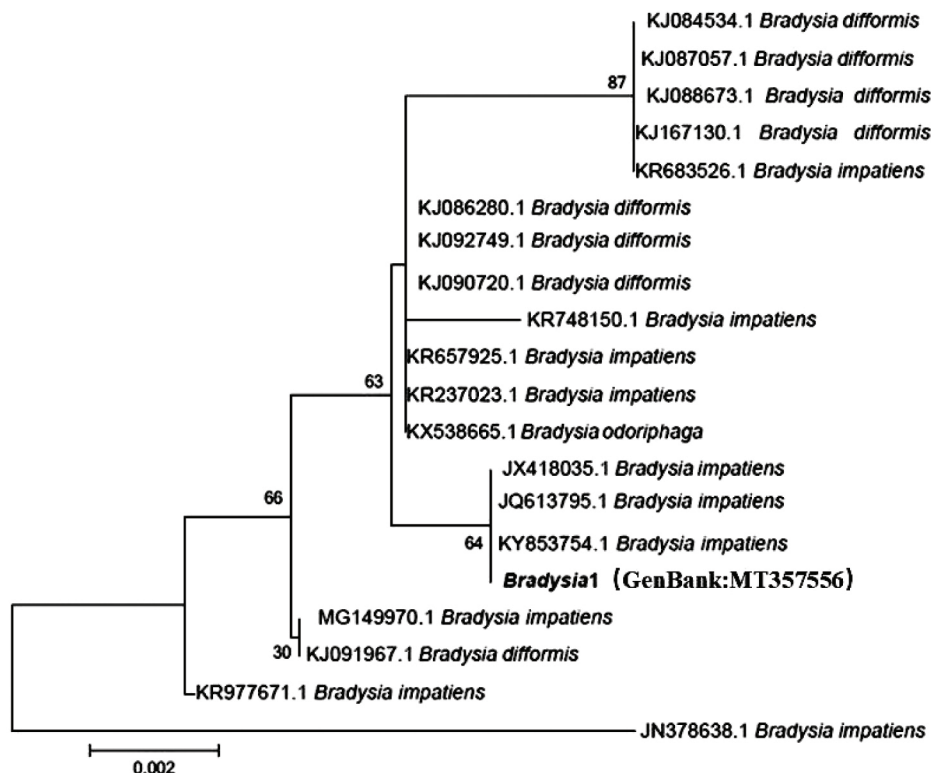


Fig. 1 Phylogenetic tree based on mtCO1 sequence data of *Bradysia* 1

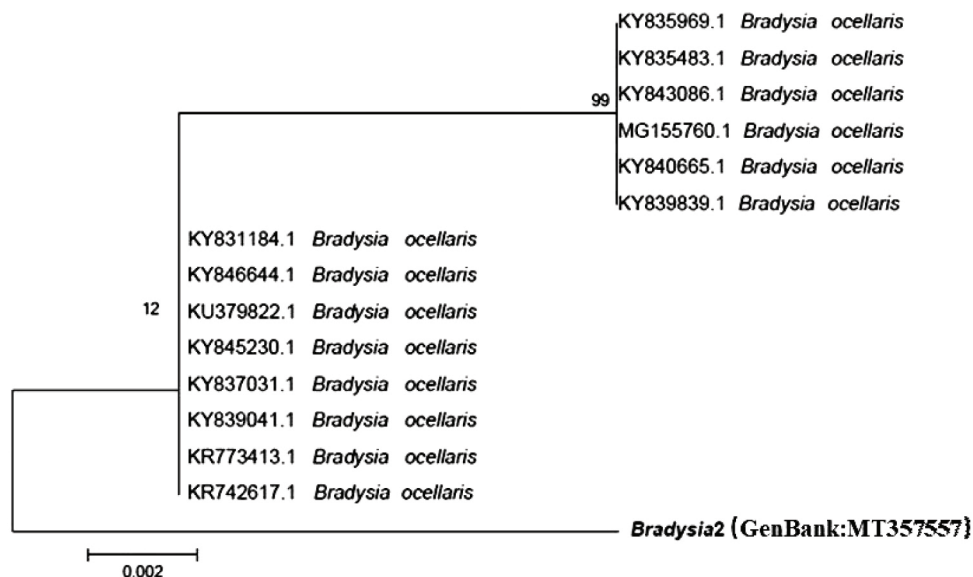


Fig. 2 Phylogenetic tree based on mtCO1 sequence data of *Bradysia* 2

Therefore, this analysis provides a useful tool for the detection and identification of *Bradysia* sp. found on this herb to develop pest control technology and to solve the technical bottlenecks impacting *A. roxburghii* production in Guangdong (Lian, 2013). Our results also alert entomologists and farmers to be aware of these potential pests on *A. roxburghii* and other Orchidaceae flowers with great economic importance.

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