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First Detection of the Stowaway *Tetraponera rufonigra* (Hymenoptera: Formicidae) in South Korea

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ABSTRACT

In this study, we report the first confirmed detection of *Tetraponera rufonigra* (Hymenoptera: Formicidae) in South Korea through international cargo. On August 3, 2024, a specimen of *T. rufonigra* was discovered at a logistics center in Icheon, a city in the midwestern part of the Korean Peninsula, during the inspection of cargo originating from Vietnam. The specimen was reported to the Invasive Species Reporting Center and subjected to field and laboratory investigations. A follow-up field survey on August 5, 2024, confirmed the absence of additional individuals, and disinfection measures were completed. DNA barcoding analysis identified the species as *T. rufonigra*. This report provides precise species-level information to support early response measures in the future.

Keywords: DNA analysis, Early detection, Invasive species, *Tetraponera rufonigra*

Introduction

With the rise in global trade and logistics, the transboundary movement of alien species has become more frequent (Montgomery *et al*., 2023). These biological invasions occur through both intentional and unintentional introductions, often allowing species to establish themselves in new regions unnoticed (Przybylski *et al*., 2022). For example, the red imported fire ant (*Solenopsis invicta*), originally from South America, has spread to countries such as the United States, Australia, and China, causing ecological and economic disruptions (Ascunce *et al*., 2011; Zhang *et al*., 2007).

A key route for the unintentional spread of alien insects is international cargo transport, including both maritime and airborne shipments. Hitchhiker ants, in particular, pose a challenge due to their ability to travel unnoticed in various packaging materials. Previously reported cases include the yellow crazy ant (*Anoplolepis gracilipes*), which has been documented spreading through cargo and impacting agricultural systems (Hasin *et al*., 2021).

Tetraponera rufonigra is an arboreal ant species widely distributed across tropical and subtropical Asia. Although less well known than other invasive ants, its sting and aggressive behavior can cause allergic reactions in humans (Fernando *et al*., 2015). While its threat level is lower than that of some other invasive species, the introduction of *T. rufonigra* still necessitates rapid identification and containment to prevent establishment.

This study documents the first detection of *T. rufonigra* in South Korea, discovered during a cargo inspection in August 2024. The findings aim to provide biological information to strengthen early detection and response systems.

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Materials and Methods

Discovery and reporting

In August 2024, an unidentified ant specimen was discovered at a logistics center in Daewol-myeon, Icheon. The specimen was found in plastic packaging during the inspection of cargo originating from Vietnam (Figs. 1, 2). It was immediately sealed, treated with insecticides, and reported to the Invasive Species Reporting Center.

Field investigation

On August 5, 2024, the Invasive Alien Species Team of the National Institute of Ecology conducted a field investigation. Two researchers surveyed the site of discovery and the surrounding area. No additional individuals were found, and quarantine measures were completed. The collected specimens were transported to the laboratory for species identification.

DNA analysis

DNA barcoding was used to identify the collected specimens. Genomic DNA was extracted using an IVT3002 Clear-S Quick DNA Extraction Kit (INVIRUSTECH, Gwangju, Korea). Polymerase chain reaction (PCR) was performed to amplify the cytochrome c oxidase I (COI) region, and the obtained sequences were analyzed using the Basic Local Alignment Search Tool (BLAST). The sequences showed 100% identity with *T. rufonigra* (Bingham, 1903; Ward, 2001).

Results and Discussion

DNA sequence analysis confirmed that the collected specimen was *T. rufonigra* (Hymenoptera: Formicidae). This species typically nests in rotten wood and tree hollows and is known for its aggressive behavior (Bingham, 1903). It has also been reported in urban green spaces, such as parks and gardens (Ward, 2001). *T. rufonigra* primarily feeds on small insects, nectar, and fruits and maintains a mutualistic relationship with the aphid *Aphis craccivora*.

Although not classified as one of the most harmful invasive ants, *T. rufonigra* has been associated with allergic reactions in humans due to its sting. A notable case was recorded in Sri Lanka in 2017. Its aggressive behavior and ability to disperse through cargo highlight the need for continued vigilance against its introduction.

Author Contributions

Project administration: Jeongseop An. Visualization: Min-ji Cha, Minju Kim. Writing – original draft: Beom-jun Jang, Jeongseop An. Writing – review & editing: Beom-jun Jang, Jeongseop An.

Fig. 1. Cargo in which *Tetraponera rufonigra* was discovered.

Fig. 2. Collected *Tetraponera rufonigra* head and lateral view photos.

Conflict of Interest

The authors declare that they have no competing interests.

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