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Research Article

New distribution record of Acacia whitefly, *Tetraleurodes acaciae* (Quaintance) on *Gliricidia sepium* (Fabaceae) in coconut system from Kahikuchi, Assam

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Abstract

The acacia whitefly, *Tetraleurodes acacia* (Quaintance) Hemiptera: Aleyrodidae), was reported for the first time on the green leaf manure, *Gliricidia sepium* (Jacq.) Steud. (Fabales: Fabaceae) from Kahikuchi, Assam in North-East India from coconut system. Prompt field identification of the acacia whitefly (*T. acaciae*) is critical because *G. sepium* forms the backbone of organic nitrogen management in sustainable coconut farming systems. The species identity was confirmed through both morphological and molecular analyses, and the partial mitochondrial cytochrome oxidase subunit 1 (*COI*) gene sequence was submitted in GenBank under accession number PX765615.1. Black puparium, U-shaped rim surrounding the vasiform orifice, submarginal gland tubercles as well as abdominal tubercle with depression are the key characteristic features of puparium identification of *T. acaciae*. Phylogenetic analysis revealed that *T. acaciae* formed a close sister clade with *Crenidorsum michellae* Takahashi, which also constituted genetically distant subgroups with *Aleurothrixus floccosus* (Maskell), *Aleurotrachelus* spp. and *Aleurocanthus* spp.

Keywords: Invasive whitefly, Identification, Coconut system, Green leaf manure, Biosecurity risks

Introduction

Whiteflies (Hemiptera: Aleyrodidae) are among the most destructive insect pests affecting agricultural production worldwide, because they inflict both direct and indirect crop losses. Direct damage occurs through sap feeding, which weakens plants, reduces photosynthetic efficiency, and causes premature leaf senescence, while indirect damage results from the transmission of several plant viral diseases (Gilbertson *et al.,* 2015). In recent years, non-native invasive whitefly species have emerged as serious production constraints to coconut, oil palm, banana, and other crops in India. Notable among them are the rugose spiralling whitefly, *Aleurodicus rugioperculatus* Martin, and Bondar's nesting whitefly, *Paraleyrodes bondari* Peracchi, which have spread extensively across the country, including the North-East region, Lakshadweep, and the Andaman and Nicobar Islands (Chandrika *et al.,* 2018; Sundararaj *et al.,* 2021; Josephrajkumar *et al.,* 2023). The acacia whitefly, *Tetraleurodes acaciae* (Quaintance), originally described from mesquite (*Acacia* sp.) in Mexico, has been reported from several countries including Belize, Costa Rica, Cuba, Dominican Republic, Guatemala, Haiti, Jamaica, Mexico, Nicaragua, Panama, Puerto Rico, Trinidad, the United States, Venezuela, and Taiwan (Nakahara,1995; Dubey & Ko, 2008). *Tetraleurodes acaciae* is one of the eleven non-native invasive whiteflies reported from the country so far (Selvaraj *et al.,* 2026). Specifically known to feed on Fabaceae plants, *T. acaciae* was first recorded on the forage crop, subabul, *Leucaena leucocephala* (Lam.) de Wit from Bengaluru, Karnataka during 2016 (Sundararaj & Vimala, 2018). Globally, 65 species of *Tetraleurodes* are known (Evans, 2007). So far, ten species of *Tetraleurodes* are reported from India and the latest being *T. acaciae* (David *et al.,* 2021). A holistic description of *Tetraleurodes* spp. with detailed taxonomic studies on the puparium was made by Nakahara (1995).

Tetraleurodes acaciae was known to feed on Kachnar *Bauhinia variegata* (L.) Benth. in Bengaluru, Urban district; tamarind, *Tamarindus indica* L., the rain tree, *Samanea saman* (Jacq.) Merr. in Shivamogga district of Karnataka, sword bean [*Canavalia gladiata* (Jacq.) DC.] in Pune, Maharashtra and mother of cocoa *Gliricidia sepium* (Jacq.) Steud. in Madurai, Tamil Nadu and Kannur, Kerala (Sundararaj *et al.,* 2021; Chandrashekar *et al.,* 2025; Logeshkumar *et al.,* 2022; Aparna *et al.,* 2025). Furthermore, Evans (2007) and Dooley (2011) reported *T. acaciae* from a wide array of host plants including *Acacia, Bauhinia, Bolusanthus, Caesalpinia, Calliandra, Cassia, Centrosema, Cercis, Chamaecrista, Cladrastis, Coursetia, Cytisus, Dalbergia, Desmodium, Diphysa, Erythrina, Gliricidia, Gymnocladus, Hardenbergia, Indigofera, Inga, Kennedia, Maackia, Millettia, Pachyrhizus, Parkia, Phaseolus, Piscidia, Pithecellobium, Prosopis, Robinia, Sophora, Templetonia, Tephrosia,* and *Wisteria*. Some hosts outside Fabaceae including *Spondias, Chamaedorea, Pseudobombax, Bursera, Symphoricarpos, Jatropha, Pelargonium, Pachira, Morus, Melaleuca*, *Bougainvillea, Rhamnus, Cotoneaster, Rosa, Populus, Capsicum* and *Parietaria* were also reported as hosts for *T. acaciae*. Logeshkumar *et al*. (2022) reported a potential parasitoid, *Amitus* sp. (Hymenoptera: Platygastridae) against *T. acaciae* which was later confirmed in the natural regulation of the pest.

Explorative surveys have been conducted to understand the distribution of invasive whiteflies from different systems of India. Herein we report, a new distribution record of *T. acaciae* from Kahikuchi, Assam during November 2025 on *G. sepium*, an important green leaf manure plant in coconut system. This marks the first distribution record of *T. acaciae* from North-East India and also from the green leaf manure, *G. sepium*.

Materials and methods

Surveillance surveys were carried out in the experimental farm (200 18' N; 910 78' E) of the ICAR-Central Plantation Crops Research Institute, Kahikuchi, Assam during November 2025. Sooty mould laden leaves of *G. sepium* were observed coupled with puparium and adult whiteflies from the undersurface of the leaves. Infested leaves were randomly collected in polybags and were observed under the stereo microscope (LEICA EZ4W) for the identification. Puparium and adults were also stained as per standard procedure and photomicrographs were documented using the Leica Research Microscope (with LAS X software. Adult whiteflies were also subjected to DNA isolation and *COI* gene analysis using PCR with specific primers as outlined by Josephrajkumar *et al*. (2020). The purified amplicons were sequenced at BioKart, Bengaluru. The *COI* nucleotide sequences of different whitefly species retrieved from GenBank as well as nucleotide sequences deposited from our laboratory were used for comparison (Benson *et al.,* 1999). BLAST was used to retrieve related sequences available in the GenBank and multiple sequence alignments were made using ClustalW (Altschul *et al.,* 1990). The phylogenetic tree was constructed with *COI* gene sequences using Mega X software by the Neighbour-joining method keeping intact only the sequences with Bootstrap values exceeding 50%.

Results and discussion

Damage symptoms

Gliricidia sepium was planted as a border tree along the farm bunds of the experimental farm of ICAR-CPCRI, Research Centre, Kahikuchi. The leaves were blackened on the upper surface by the deposit of sooty mould due to the feeding by whiteflies and the symptom was quite explicit from a distance (Figure 1a & b). The entire tee was badly infested and the damage symptoms are presented in Figure 1.

The undersurface of the leaves had both the puparia and the adult whiteflies (Figure 1c). The puparium was mostly aggregated and completely black with white fringes of wax material along the border (Figure 1e). Older puparium was devoid of white fringes of wax. Adult whiteflies are white in colour and wings are held roof-like at rest. *Paraleyrodes bondari* with silver strands co-existed with the *T. acaciae* and under such situation both the puparia are also noticed on the upper leaf surface (Figure 1b and d). Co-existence of *P. bondari* with *A. rugioperculatus*, *Aleuroclava canangae* (Corbett), *Aleurotrachelus trachoides* (Back), *Aleurocanthus woglumi* Ashby, *Aleurocanthus arecae* David & Manjunatha and *T. acaciae* were documented elsewhere (Josephrajkumar *et al.,* 2023; Logeshkumar *et al.,* 2022; Chandrashekar *et al.,* 2025).

Diagnosis-Puparium

Black puparium; length 715.6m; width 510.6m (Figure 2a); vasiform orifice wider than long; length 46.8m; width 51.1m; U-shaped rim-like part surrounding vasiform orifice; lingula bulb-like (Figure 2b); A8 short

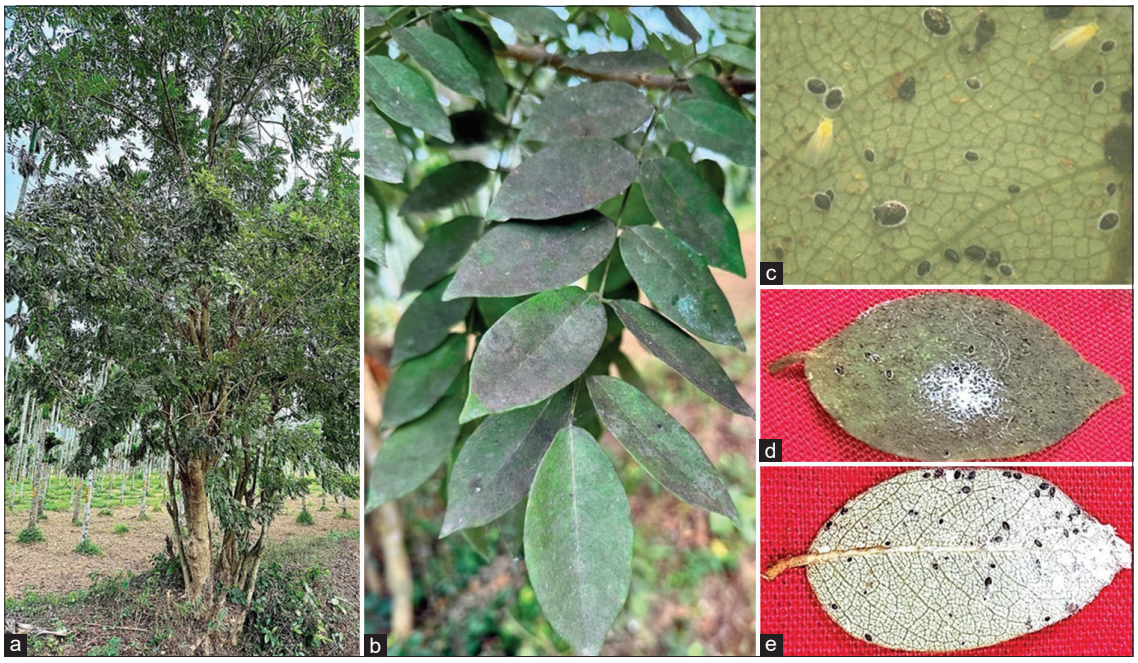

Figure 1: Damage symptoms a) *T. acaciae* infested *G. sepium* tree, b) Closer view of leaf with sooty mould symptoms, c) Undersurface of *G sepium* leaf with *T. acaciae* puparia, d) Co-existence of *P. bondari* having silver strands and *T. acaciae* puparia and e) Closer view of aggregated back puparia of *T. acaciae* with or without white marginal fringes of wax

7.8m; caudal setae 61.7m; marginal teeth (broader than long) in 100m is 8-9 with well-developed disc pore (Figure 2d); sub margin strongly elevated; submarginal gland tubercles present; abdominal segment with median tubercle and submedian depression (Figure 2c). All puparium features are in agreement with those described by Nakahara (1995) and hence, the species is confirmed as *T. acaciae*.

Field level diagnosis of *T. acaciae* indicates the black oval-shaped puparium with or without white fringes of wax and adult wings held roof-like upon rest.

Diagnosis-Adults

Antenna seven segmented, third and fourth antenna segment long, fourth segment with two long sensoria on either side, terminal segment with pointed apex and one long sensorium midway (Figure 3c); mid tibia of male with tibial comb and brush (Figure 3b); male genitalia with long, curved towards tip, rod-like aedeagus broader at base and narrowing down at tip, claspers broad and stout with setae (Figure 3a). Adult features have been documented for the first time.

In addition to the occurrence of *T. acaciae* on *G. sepium* from Kahikuchi, Assam, incidence of *A. rugioperculatus* was reported on coconut from Kamrup and Nalbari districts of Assam during 2018 (Chandrika *et al.,* 2018).

Molecular characterization

The partial nucleotide of *COI* gene from *T. acaciae* collected from Kahikuchi was characterized and subsequently deposited in GenBank with accession number PX765615.1. Phylogenetic tree was constructed using closely related nucleotide genera of *T. acaciae* retrieved from GenBank with aphids and psyllid as outgroup and presented in Figure 4.

The phylogenetic tree revealed that *T. acaciae* formed a sister clade with *C. michellae*. *Tetraleurodes acaciae* was closely related to the genus *Crenidorsum* and was genetically distant from the other genera within the tribe Aleurocanthini. Three distinct clades emerged within Aleurocanthini: the first comprised *Aleurocanthus* spp.; the second included *T. acaciae* and *C. michellae*; and the third consisted of *Aleurotrachelus* and *A. floccosus*. The placement of *A. trachoides* as a separate genus, genetically distinct from *Aleurothrixus*, was thereby further supported (Josephrajkumar *et al.,* 2024). In contrast, *Dialeurodes* spp., *Bemisia* spp., and *Aleurolobus* spp. formed a separate clade distinct from Aleurocanthini. Overall, the phylogenetic

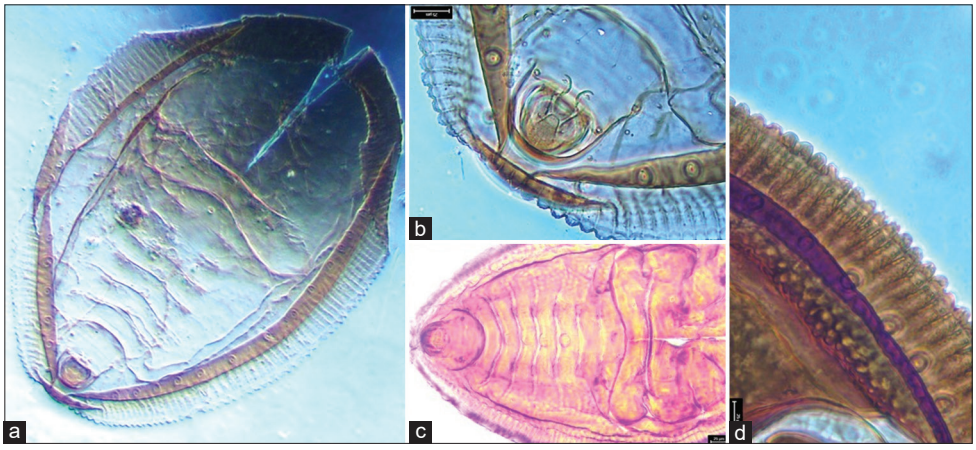

Figure 2: Puparium features a) Habitus, b) Vasiform orifice with U-shaped rim part, submarginal gland tubercles and bulb-like lingual, c) Abdominal segments with median tubercle and submedian depressions and d) Marginal crenulations with disc pores and submarginal gland tubercle

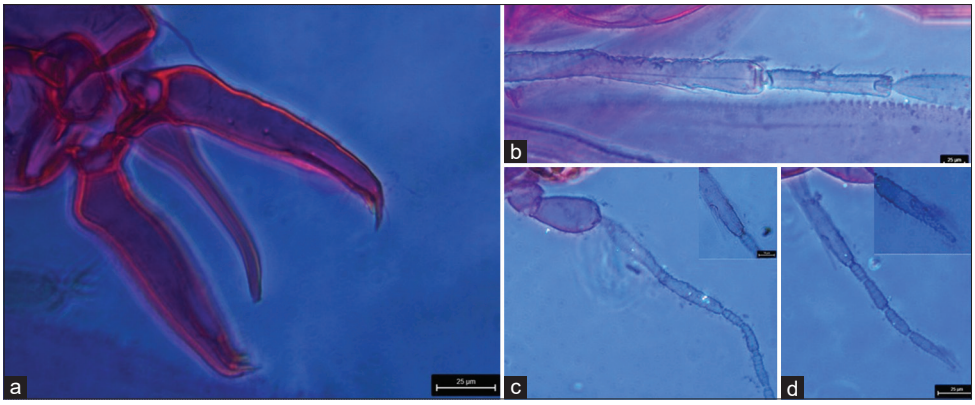

Figure 3: Adult features a) Male genitalia with claspers and aedeagus, b) Male mid-tibia with tibial comb and brush, c) Antenna with long sensoria in Seg IV and d) Antenna with long sensoria in Seg VII

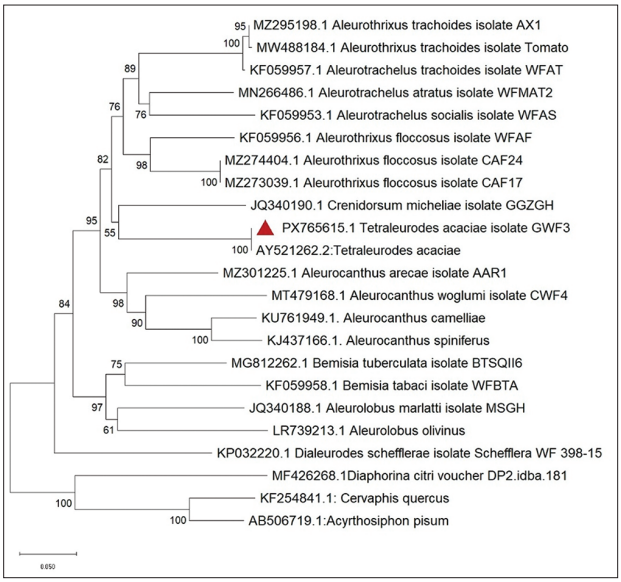

Figure 4: Phylogenetic tree of *T. acaciae* and other closely related genera

analysis clarified the genetic relationships and evolutionary lineage among the genera within Aleurocanthini and other closely related genera.

The puparial and adult morphological features of *T. acaciae* are well characterized and documented. The study further confirmed the morphological and molecular characterization of *T. acaciae* collected from Kahikuchi, Assam and also determined the new distribution of this invasive whitefly from North East India on *G. sepium* for the first time.

The acacia whitefly (*T. acaciae*) has emerged as a significant threat to *G. sepium*. This is a major concern for coconut farming systems, as *G. sepium* is widely relied upon as a nitrogen-rich green leaf manure. Because *G. sepium* was historically valued for its pest-resistant qualities, this new vulnerability requires prompt field identification to prevent nutritional inadequacies in coconut plantations. A potential parasitoid, *Amitus* sp. was found to naturally regulate the pest population under field condition.

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References

Altschul, S. F., Gish, W., Miller, W., Myers, E. W., & Lipman, D. J. (1990). Basic local alignment search tool. *Journal of Molecular Biology, 215*(3), 403-410. https://doi.org/10.1016/S0022-2836(05)80360-2

Aparna, M. V., Vinni, M., Jiji, J. V., Abduljaleel, K., & Jayakrishnan, T. V. (2025). New host record of acacia whitefly, *Tetraleurodes acaciae* (Aleyrodidae): An emerging pest of mother of cocoa, *Gliricidia sepium* (Fabaceae) from Kerala, India. *Munis Entomology and Zoology, 20*(2), 2952-2955.

Benson, D. A., Boguski, M. S., Lipman, D. J., Ostell, J., Ouellette, B. F. F., Rapp, B. A., & Wheeler, D. L. (1999). GenBank. *Nucleic Acids Research, 27*, 12-17. https://doi.org/10.1093/nar/27.1.12

Chandrashekar, K., Dubey, A. K., Verma, A., Saha, S., & Khar, A. (2025). Invasive whiteflies (Hemiptera) infesting sword bean (*Canavalia gladiata*) in India. *Indian Journal of Horticulture, 82*(2), 195-199. https://doi.org/10.58993/ijh/2025.82.2.11

Chandrika, M., Josephrajkumar, A., Singh, L. S., & Alpana, D. (2018). New distributional record of rugose spiralling whitefly on coconut in Kamrup and Nalbari districts of Assam. *Indian Coconut Journal, 61*, 19-21.

David, B. V., Jesudasan, R. W. A., & Sundararaj, R. (2021). *Handbook of Whiteflies (Aleyrodidiae: Hemiptera: Insecta)*. Brillion Publishing.

Dooley, J. W. (2011). *Whitefly pupa of the world: compendium and key to the genera of the Aleurodicinae & the Aleyrodinae*. USDA, APHIS.

Dubey, A. K., & Ko, C. C. (2008). The genus *Tetraleurodes* Cockerell (Hemiptera: Aleyrodidae) of Taiwan. *Proceedings of Entomological Society Washington, 110*(3), 760-777. https://doi.org/10.4289/07-056.1

Evans, G. A. (2007). *The whiteflies (Hemiptera: Aleyrodidae) of the world and their host plants and natural enemies*. USDA/ Animal Plant Health Inspection Service.

Gilbertson, R. L., Batuman, O., Webster, C. G., & Adkins, S. (2015). Role of the insect super vectors *Bemisia tabaci* and *Frankliniella occidentalis* in the emergence and global spread of plant viruses. *Annual Review of Virology, 2*(1), 67-93.

Josephrajkumar, A., Anes, K. M., Babu, M., Pratibha, P. S., Sajan, J. V., & Hegde, V. (2023). Exotic whiteflies and conservation biological control in coconut system. *IOP Conference Series: Earth and Environmental Science, 179*, 012006, https://doi.org/10.1088/1755-1315/1179/1/012006

Josephrajkumar, A., Evans, G., Babu, M., Anes, K. M., Jilu, V. S., Sajan, J. V., & Hegde V. (2024). Discovery of *Aleuroclava canangae* (Corbett) (Hemiptera: Aleyrodidae) on *Coleus* in India and the establishment and review of the *Aleuroclava canangae* species group. *Journal of Natural History, 58*(17-20), 603-623. https://doi.org/10.1080/00222933.2024.2347602

Josephrajkumar, A., Mohan, C., Babu, M., Prathibha, P. S., Hegde, V., & Krishnakumar, V. (2020). Diagnosis of invasive whitefly species co-occurring on coconut. *Current Science, 119*(7), 1101-1105.

Logeshkumar, P., Srinivasan, G., Shanthi, M., Chinnadurai, S., Josephrajkumar, A., Poorani, J., Venkatesh, K., & Murugan, M. (2022). First record of *Amitus* sp. (Hymenoptera: Platygastridae) parasitizing exotic Acacia whitefly, *Tetraleurodes acaciae* (Quaintance) [Hemiptera: Aleyrodidae] from India. In Book of Abstracts, Seventh National Conference on Biological Control on 75 Years of Biological Control of Pests and Diseases in Agriculture: Challenges and the Way Forward (Eds.) U. Amala *et al*., Society for Biocontrol Advancement, ICAR-NBAIR, December 15-17, 2022 Bengaluru.

Nakahara, S. (1995). Taxonomic Studies of the Genus *Tetraleurodes* (Homoptera: Aleyrodidae). *Insecta Mundi, 9*(1-2), 105-150.

Selvaraj, K., Kedar, S. C., Yadav, G. A. K., Vasundhara, J., Sundararaj R., & Sushil, S. N. (2026). Record of an exotic African whitefly *Aleurolobus graminicola* Bink-Moenen (Hemiptera: Aleyrodidae) on aromatic plant *Vetiveria zizanioides* (L.) Nash from India. *Phytoparasitica, 54*, 70. https://doi.org/10.1007/s12600-026-01403-w

Sundararaj, R., & Vimala, B. (2018). New record of the legume feeding whitefly, *Tetraleurodes acaciae* (Quaintance) (Hemiptera: Aleyrodidae) from India. *Indian Journal of Entomology, 80*(3), 1168-1169. https://doi.org/10.5958/0974-8172.2018.00158.X

Sundararaj, R., Selvaraj, K., & Sumalatha, B. V. (2021). Invasion and expansion of exotic whiteflies (Hemiptera: Aleyrodidae) in India and their economic importance. *Phytoparasitica, 49*,851-863. https://doi.org/10.1007/s12600-021-00919-7