New distributional record of invasive Neotropical coconut whitefly *Aleurotrachelus atratus* (Hemiptera: Aleyrodidae) in Tamil Nadu, India

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Abstract

Occurrence of invasive Neotropical palm infesting whitefly, *Aleurotrachelus atratus* (Hemiptera: Aleyrodidae) on coconut (*Cocos nucifera*) was recorded for the first time in Dharmapuri and Krishnagiri districts of Tamil Nadu. *Aleurotrachelus atratus* is an oligophagous pest, which prefer to feed on palm plants and is mostly distributed in tropical and subtropical regions. The infestation level observed was low (less than ten live colony or adults /leaflet) to moderate (11-20 live colony or adults /leaflet). This study also revealed the co-existence of *A. atratus* with an earlier invasive whiteflies *viz.,* rugose spiralling whitefly *Aleurodicus rugioperculatus*, nesting whitefly *Paraleyrodes minei* and Bondar' s nesting whitefly *Paraleyrodes bondari* on coconut. This quick dispersal is believed to be through transportation of infested seedling from pest affected areas. The strict domestic quarantine and sensitization of farmers and other stakeholders is to be advocated to avoid spread of this pest to other coconut and other palms growing areas in the country.

Keywords: Coconut, invasive, Neotropical, natural enemies, oil palm, Tamil Nadu

Introduction

Invasive whiteflies *viz.,* rugose spiralling whitefly *Aleurodicus rugioperculatus* during 2016, Bondar's nesting whitefly, *Paraleyrodes bondari*, nesting whitefly, *Paraleyrodes minei* during 2018 and palm infesting whitefly, *Aleurotrachelus atratus* during 2019 invaded coconut palms and raised biosecurity concerns in India (Selvaraj *et al*., 2020). They prefer to colonize on palm plants belonging to Arecaceae family. The origin of these invasive species was believed to be Neotropical regions and their interception is likely through the importation of plant materials. Both nymphs and adult whiteflies inflict direct feeding injury on the host plants while sucking

sap which leads to excessive drain of sap, necrosis and premature drying. Indirectly, the honeydew which gets deposited on the upper even some times on lower surface of the infested plants lead to the growth of black sooty mould. This is the secondary infection arising out of the whiteflies infestation which is believed to interfere with photosynthesis and yield parameters.

Among these whiteflies, neotropical palm infesting whitefly, *Aleurotrachelus atratus* was recorded for the first time in India during 2019 at Mandya district of Karnataka on coconut and ornamental areca palm (*Dypsis lutescens*) (Selvaraj *et al.*, 2019). Subsequently, it spread rapidly to adjoining districts *viz.*, Ramanagara, Mysore, Bengaluru Rural, Bengaluru Urban, Hassan, Chamrajnagar and Tumkur and extended its host ranges on areca nut (*Areca catechu*) and oil palm (*Elaeis guineensis*). So far, this species was distributed in various coconut growing areas of Karnataka. Its rapid spread and establishment could be due to high fecundity, high dispersal and survival ability, voracious feeding, ability to withstand diverse environmental conditions and benefits from mutual interaction with other insects.

This communication, confirms the occurrence and spread of this species in Tamil Nadu for the first time, natural enemies and its coexistence with other invasive whiteflies infesting coconut.

Materials and Methods

Survey: Field surveys were conducted in Pennagaram (12.1348° N, 77.8928° E) and Palakkodu (12.2986° N, 78.0738° E) of Dharmapuri district and Hosur (12.7409° N, 77.8253° E) and Bargur (12.5429° N, 78.3570° E) of Krishnagiri district of Tamil Nadu to assess the occurrence and infestation of these invasive whiteflies on coconut and other host plants. Infested coconut leaf samples sent by farmers from Marandahalli village (12.3891° N, 78.0033° E) in Dharmapuri district was also examined. Whitefy samples along with coconut leaves were collected in paper covers for further species confirmation. Whitefly species confirmation was based on morphological characteristics which were achieved by permanent mounts of the puparium; the best mounts were obtained from puparial cases from which adults had emerged. During survey, the level of infestation was assessed by visual inspection using a qualitative scale as follows, 0-10 live egg spirals or adults/leaflet (low); 11-20 live egg spirals or adults/leaflet (moderate) and > 21 live egg spirals or adults/leaflet (severe). To assess this, randomly ten leaves/palm were selected consisting of upper, medium and lower strata at each location.

Field collected infested plants were sorted whitefly species-wise and placed in a separate rearing jar (21×10 cm) and observed for the emergence of parasitoid / predators. The adult parasitoids emerging from the species wase collected using aspirator and preserved in vials containing 70% ethanol for further identification. Assessment of parasitism (%) was determined based on the number of parasitized puparia as against un-parasitized pupae in the host leaves. Identification of natural enemies such as predators was confirmed morphologically.

Results and Discussion

New distributional record: Present study revealed the presence of rugose spiralling whitefly *Aleurodicus rugioperculatus*, Bondar's nesting whitefly, *Paraleyrodes bondari*, nesting whitefly, *Paraleyrodes minei* and palm infesting whitefly, *Aleurotrachelus atratus* on coconut. Occurrence of *A. rugioperculatus* (Sundararaj and Selvaraj, 2017), *P. bondari* and *P. minei* (Josephrajkumar *et al.*, 2020) in the state was reported earlier. The present study revealed the occurrence of Neotropical palm infesting whitefly, *A. atratus* in Dharmapuri and Krishnagiri districts of Tamil Nadu. The infestation of *A. atratus* was low (0-10= live egg spirals or adults/leaflet) to moderate (11-20= live egg spirals or adults/leaflet) and it seems that pest was at initial stage of invasion (Fig.1). This pest population may increase during dry months (March to May) as experienced in Karnataka. The pest might have spread from Karnataka through transportation of infested seedling from adjoining districts *viz.*, Mandya and Mysore.

Studies also revealed the co-ocurrence of *Aleurotrachelus atratus* with other invasive species such as rugose spiralling whitefly *Aleurodicus rugioperculatus*, nesting whiteflies, *P. bondari* and *P. minei* (Fig. 2). Among the species, *Aleurodicus rugioperculatus* and Bondar's nesting whitefly, *Paraleyrodes bondari* was found to be dominant with moderate (11-20= live egg spirals or adults/leaflet) to severe (30= live egg spirals or adults/leaflet) infestation and major portion of leaves infested in terms of number of colonies. These whiteflies colonize on the dorsal surface of the leaflets in groups, *A. rugioperculatus* and *A. atratus* have higher damage potential, production of intense white wax which often cover entire immature stages as compared to nesting whiteflies which produce moderate loose wax. On the other hand, the feeding damage by the nesting whiteflies has not been as intense as that of *A. rugioperculatus* and *A. atratus* with minimum honey dew and sooty mould deposits observed on coconut.

Fig.1. Symptoms of damage of palm infesting whitefly on coconut

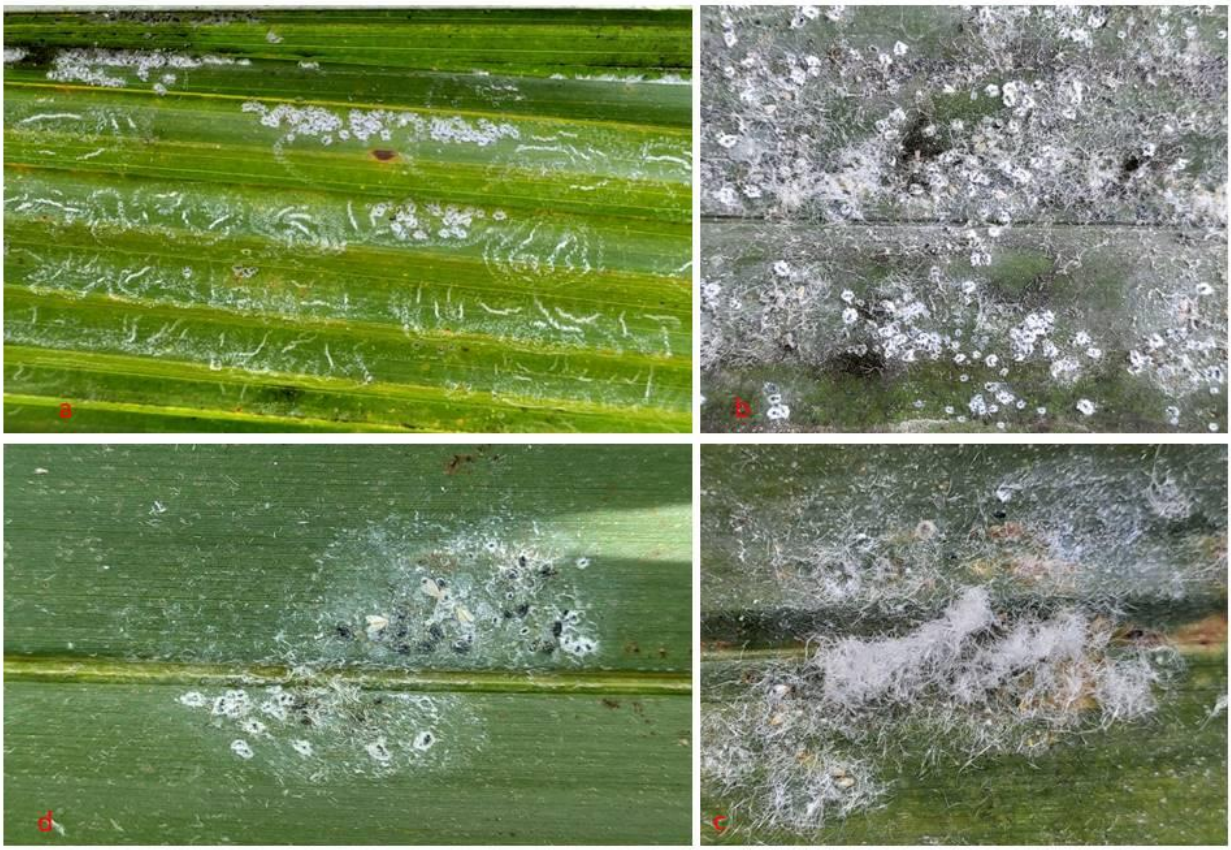

Fig.2. Co-occurring of palm infesting whitefly with rugose spiralling whitefly (a); nesting whitefly (b-c); Bondar's nesting whitefly (d) on coconut

Occurrence of parasitiod *Encarsia guadeloupae* Viggiani (Hymenoptera: Aphelinidae) on *Aleurodicus rugioperculatus* was recorded with natural parasitism to the extent of 42-68% on coconut. *Encarsia guadeloupae* is the potential dominant parasitoid for *A. rugioperculatus* with 62-82% natural parasitism on coconut and many other host plants (Selvaraj *et al.*, 2016). In case of Bondar's nesting whitefly, *P. bondari*, nesting whitefly, *P. minei* and palm infesting whitefly, *A. atratus*, no parasitism observed so far under field conditions. Similar observation was also reported earlier in Karnataka (Selvaraj *et al.*, 2019). This shows that these invasives might have entered into India without their natural enemy's complex and this might have favoured for severe outbreak situation in short span of time. Among predators, only a generalist predator, *Pseudomallada astur* (Neuroptera: Chrysopidae) was found to feed on *A. atratus, P. bondari* and *P. minei* during survey. This quick dispersal is believed to be through transportation of infested seedling from pest affected areas. The strict domestic quarantine and sensitization of farmers and other stakeholders to be advocated to avoid spread of this pest to other coconut and other palms growing areas in the country.

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