

Invasion of Non-native Neotropical Woolly Whitefly *Aleurothrixus floccosus* (Maskell) on Guava in India

Introduction: Guava (*Psidium guajava*) is one of the important commercial fruits in India. It is the fourth most important fruit crop after mango, banana and citrus. More than 80 insect species reported to attack on guava resulting reduction in quality and yield. Among insects, fruit fly, mealybugs and whiteflies are major pests often causing economic damage and yield loss.

About 10 whiteflies, which includes four non-native species such as spiralling whitefly, *Aleurodicus dispersus*, rugose spiralling whitefly, *A. rugioperculatus*, Bondars nesting whitefly, *Paraleyrodes bondari*, Nesting whitefly, *P. minei* attack on guava in India. During 2019, occurrence of the invasive woolly whitefly, *Aleurothrixus floccosus* (Maskell) on guava was recorded for the first time from India at Kerala.

Origin and distribution: The whitefly is believed to be Neotropical origin but is now found throughout the warmer parts of the world, wherever citrus is grown. In India, occurrence of this pest was observed in Kozhikode and Malapuram districts of Kerala on guava. Subsequently, it was found in Ramanagara, Mandya, Mysore, Udupi, Tumkur, Bengaluru Rural districts of Karnataka and Coimbatore, Dharmapuri, Krishnagiri and Salem district of Tamil Nadu and Lakshadweep islands. Spreading rapidly mostly through the infested seedlings.

Host plant: *A. floccosus* is broadly polyphagous, feeding on 20 plant families and exhibits a strong host preference for citrus species but so far in India, it was found to feed only on guava.

Co-occurrence with other insects: Within a span of four years, four exotic whiteflies invaded on guava. *A. floccosus* is in co-existence with *P. bondari*,

P. minei, *A. dispersus* and *A. rugioperculatus*. *A. floccosus* is found to be dominant species which may replaces the existing invasive and native species by inter-specific competition.

Diagnostic characteristics: Female adult lays eggs in circular pattern, however, the eggs were laid upright or at a slanting angle. When the large number of adults oviposited on a leaf, the spirals often overlapped together and individual spirals is difficult to distinguish. A granular, powdery wax mass was deposited all around the eggs and appears as a flat, circular, grainy white areas.



Woolly whitefly co-occurring with nesting whitefly

All the instars excrete honeydew and in older pupae the deposited honeydew droplets get dried and turned brownish orange as they became contaminated with saprophytic fungi. *A. floccosus* population was normally increased whenever there was new leaf/flush growth on the plants.

Symptoms of damage: Nymphs and adults suck phloem sap from host plants and these infested plants showed severe feeding damage such as wilting, yellowing and leaf fouling and indirectly causing damage by copious excretion of honeydew which supports the development of the sooty mould.

Presence of ants (mostly black and red ants), profuse whitefly mealy wax and black sooty mould is sign of the infestation of this pest.

Severe infestation leads to complete blackening which might reduce the photosynthetic ability of infested plants significantly, resulting in leaf fall, senescence and eventual death.



Symptoms of damage of woolly whitefly on guava

Biology and description: The sausage shaped, pale white eggs were deposited in a circular pattern and attached to the under surface of the leaf with stalks which changes to brown colour before hatching.

The first nymphal instar is light green, flattened, oval shaped and there was a little marginal wax and three pairs of wax dots on the dorsal surface of the nymphs.

Subsequent instars are sedentary, turn brown and developed a thin thread like wax strands that curled upside into a woolly mass substance as development progressed.

Late instar nymphs are often completely obscured by copious amounts woolly wax that was several times thicker than the body of the insect, honeydew droplets and cast skins.



Life stages of woolly

Adults emerge from the pupae by vertically splitting its skin and they are about 1.5 mm in length, with a yellow-white body and wings that are covered with a white waxy powder.

It takes about 24 to 27 days to complete the development of eggs to nymphs and adult longevity is 27 to 30 days. Total life span of this whitefly from eggs to adult is take about 51- 57 days.

Natural enemies: No natural parasitism either of the indigenous parasitoid or its potential parasitoid *Cales noacki* (Hymenoptera: Aphelinidae) was observed. Few predators such as *Acletoxenus indicus*, *Pseudomallada astur*, *Cryptolaemus montrouzieri* and *Scymnus nr. utilis* were found associated with *A. floccosus* colony.



***Pseudomallada astur* feeding on woolly whitefly**

Integrated management strategies

1. Stringent quarantine protocols to prevent its further spread to other guava and citrus growing areas in India immediately.
2. Avoid transportation of guava seedling from pest infested areas to un-infested areas.
3. Strict following of domestic quarantine.
4. Create awareness among farmers and other stakeholders on invasion of this pest.
5. Continuous monitoring on pest and natural enemies on different host plants in field.
6. Install yellow sticky traps @ 10 number /ha for monitoring the pest population.
7. Release of the predator *Pseudomallada* (= *Dichochrysa*) *astur* @ 1000 eggs/ha at 15 days interval.
8. Two spray entomopathogenic fungus *Isaria fumosorosea* (Pfu-5) at 5 g/litre at 15 days intervals.
9. Avoid usage of any synthetic pesticides, apply only neem @1% if severe outbreak situation prevails.
10. Follow community based approach to manage these whiteflies in coconut garden.
11. Exploration of importation of potential parasitoid for classical biological control programme.



Natural enemies of woolly whitefly

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