

# Invasive rugose spiraling whitefly (RSW) in coconut plantations: Bio-intensive management

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East Coast Tall (ECT) plantation at SKPP Polytechnic College, Ramachandrapuram selected for evaluation of bio pesticides (2020-21).



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## Introduction

Coconut (*Cocos nucifera* L.) is one of the most important plantation crops in India and several South East Asian countries. India is the largest coconut producing country, and is the third largest country in area under coconut with 2,199 hectares under the crop. The annual production is up to 20,736 million nuts with a productivity of 9430 nuts/ha (ICC, 2021). However, the production and productivity of coconut palm is often limited by incidence of several pests and diseases (Chowdappa *et al.*, 2018 and Neeraja *et al.*, 2020). Exotic pests cause billions of dollars in damage and substantial ecological changes in native horticultural ecosystems (Simberloff *et al.*, 2013). Rugose spiraling whitefly (RSW), *Aleurodicus rugioperculatus* Martin (Hemiptera: Aleyrodidae) is highly polyphagous and invasive pest, reported for the first time in India during 2016 in Tamil Nadu on coconut plantations (Selvaraj *et al.*, 2016) which was later on identified from different coconut growing areas of India viz., Kerala, Karnataka and Andhra Pradesh.

Bio-pesticides based on plants and pathogenic microorganisms are particular to target insect pest

which offer an ecologically sound and effective solution to pest problems (Gupta and Dikshit, 2010). Although, the chemical pesticides may be effective on crop pests, their long-term usage affects the natural enemy population, resistance development in pests and environmental pollution. The entomopathogenic fungus, *Isaria fumosorosea* was found effective mainly against whiteflies (Luangsa-Ard *et al.*, 2005) and the fungus was used as potential biocontrol agent against RSW under natural field conditions in Florida (USA) (Kumar *et al.*, 2018). To achieve long-term pest suppression of RSW in a sustainable manner, bio-control agents like, entomo-fungal pathogens and botanical pesticides were evaluated against the invasive RSW under field conditions. The benefits of bio-pesticides would reduce load of synthetic insecticides, delayed onset of resistance in the pest populations and safer habitat for natural enemies and pollinators (Ali *et al.*, 2015).

## Field Evaluation of Bio pesticides against rugose spiraling whitefly (RSW)

Field efficacy of various bio-pesticides was evaluated against RSW in East Coast Tall (ECT) variety of 7 years age-old palms with medium RSW incidence



High Jet Sprayer



Spraying of Biopesticides

(10-20 spirals per leaflet) as per the damage rating scale developed by Srinivasan *et al.*, (2016) during December, 2020 to February, 2021 and December, 2021 to February, 2022 at Dr. YSR HU - SKPP Polytechnic college, Ramachandrapuram (16°83'72"NL and 82°03'25" EL) and Dr. YSR HU - HRS, Ambajipeta (16°59'38"NL and 81°95'36" EL). Evaluation of bio pesticides was undertaken at Ramachandrapuram, horticultural polytechnic college working under the aegis of Dr. YSR Horticultural University during 2020-21.

The entomo-fungal pathogens were applied through foliar sprays of talc formulations at the dose of 0.5 per cent during December to February (four rounds) at 15 days intervals (T1, T2, T3 and T4). Azadirachtin 10,000 ppm (T5) at the concentration (0.1 per cent) and Soapnut powder at 0.3 per cent (T6) were sprayed similarly. Jet water spray was also given as a treatment. Every treatment is replicated thrice with two palms in each replication. Untreated palms were considered as control treatments. Spray fluid of 5-10 l per palm were used based on canopy of the palm.



East Coast Tall (ECT) plantation at HRS, Ambajipeta selected for evaluation of bio pesticides (2021-22)

### High Jet Sprayer Spraying of Biopesticides

The observations on RSW incidence were made at weekly intervals starting from 7 days after imposing the treatments and continued up to 28 days. The data concerning number of RSW nymphs and adults were recorded on four randomly selected infested leaflets per frond per palm from the top, middle and lower whorl representing four directions (total of 4 fronds/palm) was worked out and expressed as mean number of leaflet/frond/palm (total of 4 leaflets/frond) (16 leaflets/palm) at 1 day before spraying (DBS), 7, 14, 21 and 28 days after spraying (DAS).

Evaluation of bio pesticides viz., *B. bassiana*, *I. fumosorosea* NBAIR pfu-5, *M. anisopliae*, *L. lecanii*, Azadirachtin 10000 ppm, soapnut powder and Jet water spray were carried out against RSW infested coconut palms with medium incidence during 2020-

Estimation of RSW incidence and intensity (%) were also calculated using the following formulae:

$$\text{RSW Incidence (\%)} = \frac{\text{(Number of leaflets infested by RSW)}}{\text{(Total number of leaflets per palm)}} \times 100$$

$$\text{RSW Intensity (\%)} = \frac{\text{(Number of fronds infested by RSW)}}{\text{Total number of leaflets per leaf}} \times 100$$

21 and 2021-22.

### Efficacy of bio pesticides against

#### a. Incidence and intensity of RSW, *A. rugioperculatus*

The pooled analysis of two years results revealed that, significantly lower incidence and intensity of RSW was observed in all the treatments with bio



*I. fumosorosea* NBAIR pfu-5 infested RSW nymph and adult

pesticides and jet water spray after the second spray onwards, compared to the untreated control palms. However, among the seven treatments tested, *I. fumosorosea* NBAIR pfu-5 spray gave the lowest incidence of RSW (37.98, 33.28 and 29.44 per cent at 14, 21 and 28 DAS) and RSW intensity (45.94, 41.71, 36.58 and 30.93 per cent) compared to the incidence (48.23, 51.35 and 52.96 per cent) and intensity of untreated control palms (50.89, 51.99, 54.86 and 55.73).

**b. Nymphs of RSW, *A. rugioperculatus***

The pooled analysis of data indicated that, significant difference was observed among different treatments against RSW nymphs from 7th day and continued till 28th day after spraying. Treatment (T5) Azadirachtin 10000 ppm @ 1 ml/l recorded least number (25.74, 22.14, 17.67 and 15.82 nymphs) with 27.27 per cent reduction after spraying, 45.86 per cent reduction over control and proved to be superior over remaining treatments. The control



*M. anisopliae* infested adult

treatment (T8) was recorded with highest population of 33.47, 35.23, 38.81 and 42.76 nymphs per leaflet.

**c. Adults of RSW, *A. rugioperculatus***

The pooled analysis of results depicted that, significant difference was observed among different treatments against RSW adults. *I. fumosorosea* NBAIR pfu-5 @ 5 g/l (T2) recorded lowest number (19.57, 17.39, 15.84 and 14.81 adults) with 24.99 per cent



*B. bassiana* infested nymphs and adults



*L. lecanii* infested nymph and adult

reduction after spraying, 29.44 per cent reduction over control and proved to be superior over other treatments. The control palms (T8) were recorded with highest population of 22.01, 24.27, 24.44 and 25.08 adults per leaflet.

### Conclusion

Considering all aspects in the present study, azadiracthin 10,000 ppm significantly reduced the nymphal population of RSW and *I. fumosorosea* NBAIR pfu-5spray was significantly superior against RSW adult population, pest incidence and pest intensity, compared to that of other treatments.

Further research studies on combined use of Azadiractin and *I. fumosorosea* may be helpful for effective management of coconut RSW.

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## Seminar on ‘Sustainable Coconut Processing Strategies for Global Market



CSIR-NIIST, Thiruvananthapuram, Kerala in association with International Coconut Community (ICC) and Coconut Development Board organized a Seminar on ‘Sustainable Coconut Processing Strategies for Global Market on 12<sup>th</sup> September 2023 at CSIR-NIIST, Thiruvananthapuram in commemoration of the World Coconut Day. The seminar offered a platform for convergence of researchers, scientists, policy makers, officials from Central and State Governments agencies, agri-business experts, farmer groups, farmer producer organizations, entrepreneurs and exporters.

Dr. Jelfina C. Alouw, Executive Director of the International Coconut Community (ICC) while talking during the occasion stressed on the need for quality, sustainability and competitiveness in the coconut sector for the industry to sustain. Dr.

Anantharamakrishnan, Director, NIIST presented the impacts of global warming on coconut production and called for promoting research and studies focused on solutions for the same. Dr. Hanumanth Gowda, Chief Coconut Development Officer, CDB highlighted the challenges faced by farmers due to price fluctuations and lack of comprehensive strategy for processing.

Technical sessions and panel discussions on research and development interventions for cultivation, crop management and value addition of coconut were organized as part of the programme. The seminar brought research and industry closer and the issues faced by the industry in processing of coconut were presented by the entrepreneurs which was addressed through technology and policy by officials of NIIST and CDB. The outcome of the seminar was not only bridging of the gap between technology and the end user but also the creation of the road map for upgrading the coconut industry in terms of technology, quality and packaging.