

## ICAR-NBAIR Curtails Dangerous Invasive Rugose Spiralling Whitefly through Innovative Biocontrol Strategies

Highly polyphagous invasive rugose spiralling whitefly (RSW), *Aleurodicus rugioperculatus* Martin was recorded on coconut at Pollachi, Tamil Nadu in 2016 by scientists from ICAR-NBAIR, Bengaluru. Subsequently, the pest rapidly spread to coconut growing districts of entire South India. It was later found to be feeding on banana, sapota, maize, oil palm, mango, cashew and many other ornamental plants. Recently, its occurrence was reported in Goa, Assam, West Bengal, Maharashtra and Gujarat. Nymphs and adults of this whitefly damage the plants by sucking the plant sap, especially from under surface of the leaves.



Adults produce prodigious quantities of honeydew which in turn gets darkened by the development of sooty mould on the upper surface of leaves. The characteristic concentric waxy spiralling symptoms are noticed on several parts of the host plants. The hybrid and dwarf varieties of coconut like Chowghat orange dwarf, Malayan orange dwarf and Ganga bondam are preferred by the RSW.

### Failure of chemical pesticides

Alarmed by the invasion of a pest unknown to them, farmers resorted to spraying of chemical pesticides to control RSW. But the efforts were in vain as the chemicals turned out to be a temporary fix and moreover, other ill effects like environmental pollution, killing of natural enemies and health risks to the people involved in spraying operations made the insecticide application a risky business apart from being uneconomical.



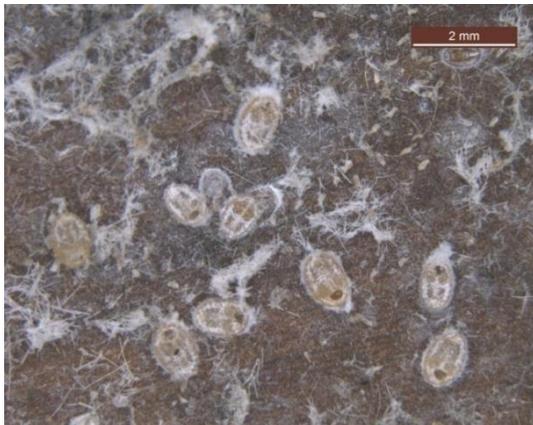
### Biological control as an effective and sustainable solution

Explorations were carried out so that biological control of the pest could be accomplished through naturally occurring insect predators and parasitoids which are economically feasible, ecologically compatible and environmentally benign. Among natural enemies encountered, two aphelinid parasitoids, *Encarsia guadeloupeae* and *E. dispersa* were found to have colonized the RSW and naturally suppressing the pest. The dominant parasitoid was found to be *E. guadeloupeae* as it recorded natural parasitism of 56-82% while *E. dispersa*

recorded 5-10%. Apart from these parasitoids, *Dichochochrysa astur*, *Jauravia pallidula*, *Cheilomenes sexmaculata* and *Cybocephalus* sp. were also observed to be feeding on RSW.

### **Augmentation and conservation of *Encarsia guadeloupae***

Since natural enemies, particularly *E. guadeloupae* (Fig. 1) was found to be suppressing the population of RSW effectively; farmers and other stakeholders were advised to re-distribute the parasitoids wherever they were absent or found in inadequate numbers by using field insectary techniques such as strategically placing the field collected parasitized nymphs in, on or next to infested vegetation for augmentation and further they were strictly advised not to apply chemical pesticides. In areas where chemicals were not applied, parasitoids were observed to have multiplied rapidly and natural parasitism increased phenomenally thus preventing severe outbreaks. Frequent monitoring of the pest occurrence were carried out done and pesticide holidays were declared so as to conserve the natural enemies. Banana and *Canna indica* were found to be harbouring maximum population of parasitoids in field as well as in net-houses. The growers were advised to grow these plants as banker plants in coconut garden for conservation and augmentation.

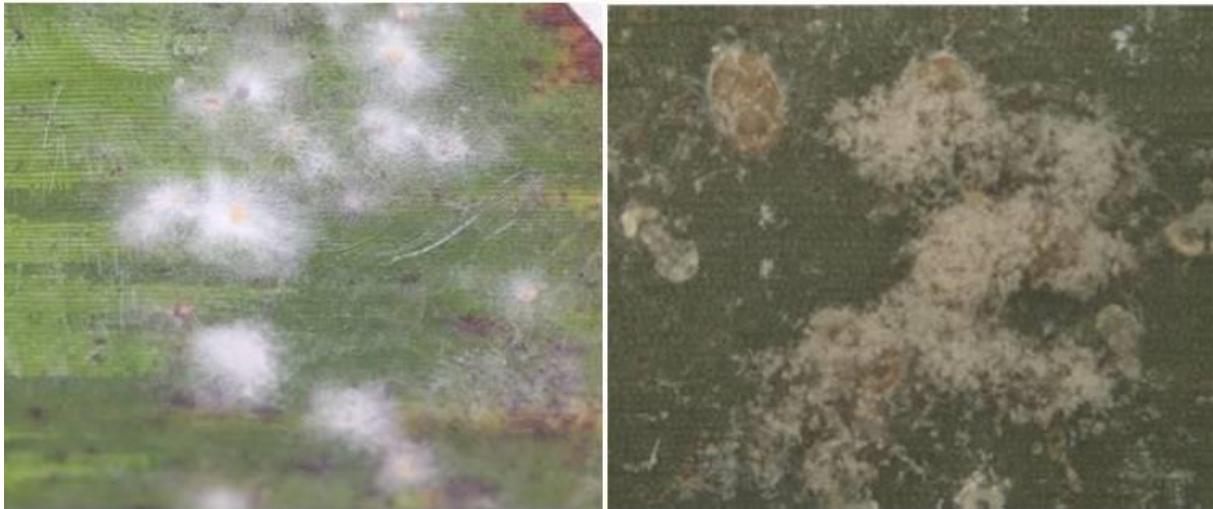


**Fig.1: *Encarsia guadeloupae* nymphs (L) and adult (R)**

### **Entomopathogenic fungus, *Isaria fumosorosea* Wize (ICAR-NBAIR pfu-5) a promising bioagent against RSW**

ICAR-NBAIR has identified a promising entomopathogenic fungus, *Isaria fumosorosea* (ICAR-NBAIR pfu-5) based on laboratory bioassays (Fig. 2) and also on multi-locational field evaluation in Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. The fungus was effective in killing all the life stages of the pest. The egg and early instar nymphal mortality was up to 91% and the late nymphal instars and pupal mortality was up to 80%. Mass production technology for this fungus has been standardized using solid state fermentation (rice grains) and liquid state fermentation technology (Saboroud dextrose yeast broth, potato dextrose

broth). Talc, rice grain and oil formulations have been developed with long shelf life (Fig. 3). Due to its high field efficacy there is a huge demand for this biocontrol agent from the coconut farming community. Farmers in Andhra Pradesh are regularly trained on farm level production of this fungus using rice grains as substrate for their use in the coconut gardens.



**Fig. 2:** *Isaria fumosorosea* (NBAIR-Pfu5) growth on RSW nymphs

ICAR-NBAIR is carrying out extensive research on biological control of this pest on a priority basis under its core programme as well as under a project funded by the Coconut Development Board, Kochi. ICAR-NBAIR has developed biocontrol strategies using parasitoids and the entomofungal pathogen *I. fumosorosea* for the efficient management of the RSW within a short span of time. Economic analysis of the impact of conservation and augmentation of *E. guadeloupae* and foliar application of *I. fumosorosea* for management of RSW indicated that about Rs 9500/ha crop protection cost and 900 ml of pesticides/ha are being saved.



**Fig. 3:** Talc and rice based formulations of *Isaria fumosorosea*

**Source:** The Director, ICAR-National Bureau of Agricultural Insect Resources, Bengaluru-560024