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Bio Intensive Management of Invasive Rugose Spiralling Whitefly in Coconut

M. Alagar[1*], V. Sivakumar[1], S. Chinnaduari[1], P. A. Saravanan[2], T. Srinivasan[3] and S. Praneetha[1]

[1]Dept. of Horticulture, Coconut Research Station, Aliyarnagar, Tamil Nadu (642 101), India

[2]Dept. of Agricultural Entomology, TNAU, Coimbatore, Tamil Nadu (641 003), India

[3]Dept. of Millets, TNAU, Coimbatore, Tamil Nadu (641 003), India

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Corresponding Author

M. Alagar

e-mail: siaamalagar@gmail.com

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E-mail: *bioticapublications@gmail.com*

Abstract

The Rugose Spiralling Whitefly (RSWF) (*Aleurodicus rugioperculatus*) was noticed in a severe form in coconut palms in Pollachi, Coimbatore district, Tamil Nadu, India during August-September, 2016. This pest usually does not kill the plant, but it may interfere with the normal growth of the palm. The infestation of RSWF was high in dwarf and hybrids and very low in tall varieties. The adult longevity was 20.5 days. Integrated Pest Management strategies play key role in managing this pest. The Aphilinid parasitoid, *E. guadeloupae* plays a major role in controlling RSWF apart from several other predators.

Introduction

The Rugose Spiralling Whitefly (RSWF) (*Aleurodicus rugioperculatus*) (Aleurodidae: Hemiptera) was described by Martin from Belize in Central America in 2004. It invaded Florida in the United States during 2009 and Guatemala (Stocks, 2012). RSWF was noticed in a severe form in coconut palms (Arecales: Arecaceae) in Pollachi, Coimbatore district, Tamil Nadu (10.491° N; 76.980° E), India during August-September, 2016 (Srinivasan *et al.*, 2016; Sundararaj and Selvaraj, 2017), Chenganassery, Kottayam District of Kerala in India and other parts of the country.

Nature of Damage and Symptoms of RSWF

The nymphs and adults RSWF de-sap from the under surface of the coconut leaflets by its pointed stylets. Due to continuous feeding, sweet honey dew in huge quantum is excreted by nymphs and adults and drift downwards which deposited on the leaves of coconut and other crops grown down beneath. Honey dew excretion, being sweet and watery, attracts ants and encourages growth of the sooty mould fungus, which causes disfigurement of leaves affecting the photosynthetic efficiency of the plant. Honey dew excretion, being sweet and watery, attracts ants and encourages growth of the sooty mould fungus which causes disfigurement of leaves this may affect the photosynthetic efficiency of the plant. The sooty mould are mere sugar feeding fungus, farmers need not be worried about such black deposits on crop plants as they are not poisonous to crop, there is absolutely no need for any panic among the farmers. In case of severe attack, egg spirals could be located on leaf, petiole as well as on tender coconuts. This pest usually does not kill the plant, but it may interfere with the normal growth.

The Main Symptoms of Damage are-

- White egg spirals of rugose spiraling whitefly on the

underside of leaves

• Presence of heavy white waxy material on the under surface of leaves.

• Presence of sticky honeydew around the whitefly infested area.

• Black sooty mold formation on the coconut leaves and also leaves of other crops which are grown under the coconut.

Bioecology

RSW is a small sap sucking insect belonging to Hemiptera order which is taxonomically related to mealy bugs and aphids. The adult whitefly looks like a very small moth and have a body length of about 2 mm. Wings of adults are white and have dark spots on the forewings. Adults have greyish eyes. The males are slightly smaller than females and have elongate claspers at the distal end of the abdomen. Eggs are elliptical and yellowish in colour, 0.3 mm long, translucent with a short stalk and are laid singly and associated with irregularly spiralling deposits of white flocculent wax surrounding each egg in a semi-circular spiralling fashion. The spiralling of waxy material is the feature from which its common name, spiralling whitefly is derived. Adult whiteflies had opening on the ventral side through which the white flocculent material emerges out. The first-instar crawlers are the immature stage with functional legs and distinct antennae and are mobile. Subsequent larval stages are sedentary and have oval shaped soft bodies with cream colour studded with white waxy material on the sides. The final immature stage is the pseudo-puparium, which is about 1 mm in length and is used in taxonomic identification.

Infestation of RSWF in Different Varieties of Coconut

A study was conducted to ascertain the relative susceptibility and resistance reactions of different coconut varieties and hybrids against RSWF. The RSWF infestation grade index revealed that the dwarf coconut varieties were susceptible to *A. rugioperculatus* when compared to tall varieties. The infestation index was high in Chowghat Orange Dwarf followed by Malaysian Yellow Dwarf, COD × WCT hybrid, Malaysian Green Dwarf (MGD). Medium level of infestation was recorded in Kenthali Dwarf (KTD). The infestation was low in WCT, Arasampatti tall and all other all varieties.

Biology of RSWF in Coconut

Eggs were found to smooth, elliptical, whitish to yellow in colour, 0.4 mm long translucent with a short stalk and are associated with irregular spiralling deposits of white flocculent wax. Egg has got an incubation period of 6.7 days. Rugose spiralling whitefly has four distinct nymphal instars. The first-instar is known as crawlers because it is the only mobile immature stage. The first, second, third and fourth instar nymphal developmental periods recorded on dwarf coconut trees were 5.5, 5.2, 7.8 and 9.2 days respectively. The total nymphal developmental period was 27.7 days. The final immature stage or fourth instar is called pseudo-puparium, which is about 1 mm in length which is morphologically distinct from other instars. Rugose spiralling whitefly adults are about three times larger (approx. 2.5 mm) than the commonly found other whiteflies in cotton and other ecosystems and are lethargic in nature. The adult emerged from the pseudo pupae on 34.4 days. The adult longevity was 20.5 days. The total developmental period of the RSWF was 54.9 days.

Host Range

It is a polyphagous pest feeding on a wide range of host plants including palms, woody ornamentals, and fruits. Florida Department of Agriculture and Consumer Services (FDACS), Division of Plant Industry (DPI) records from 2009 to 2015 identified rugose spiraling whitefly feed on at least 118 plant species, which include a combination of edibles, ornamentals, palms, weeds, as well as native and invasive plant species.

Occurrence of Parasitoids and Predators in Tamil Nadu

One species of aphelinid nymphal parasitoid and 8 species of predatory Coccinellidae and Chrysopidae were observed in the RSWF affected coconut gardens. The *Chrysoperla zastrowi sillemi* and *Mallada desjardinsi* from Chrysopidae and six coccinellid predators were recorded. The red ant, *Oecophylla smaragdina* was also recorded. Among all the natural enemies, the aphelinid parasitoid, *E. guadeloupae* plays a major role in managing RSWF.

Integrated Pest Management Strategies

• Setting up of yellow light traps @ 2 /acre during night hours between 7.00 pm and 11.00 pm for monitoring and trapping of flying RSWF adults.

• Setting up of yellow sticky traps smeared with castor oil/ horticultural mineral oil to a height of 5.5' for monitoring and mass trapping the flying adult pest population @ 10 / acre during day time.

• Spraying a jet of water forcibly on the under surface of the palms to dislodge the RSWF colonies.

• Spraying with neem oil @ 0.5% /lit (5 ml of neem oil in 1 liter of water) along with 1 ml of sandovit would be helpful in

minimizing the population buildup of the pest during severe outbreak.

- Release of chrysopid predator @ 400 /acre.
- Release of *E. guadeloupae* parasitoids by stapling leaf bits containing the RSWF puparia (parasitised by *E. guadeloupae*) under the coconut leaflets @ 1 leaf bit / 10 trees.
- Spraying of insecticides would highly suppress the population buildup of all the natural enemies and hence pesticidal sprays are to be strictly avoided.
- Moreover, spraying with boiled *maida* flour paste @ 25 g/ lit of water will remove flakes of sooty mould from the upper surface of the leaves in the affected palms.

Figure 1: Symptoms of RSWF

Figure 2: Severe infestation of RSWF on the lower surface of the leaves

Figure 3: RSWF adults

Figure 4: *E. guadeloupae* adult

Figure 5: Setting up of light traps (low cost light trap)

Figure 6: Setting up of yellow sticky traps

Figure 7: Forcible water spray

Figure 8: Stapling leaf bits containing *E. guadeloupae* parasitised nymphs

Conclusion

Rugose spiralling whitefly is a notorius pest on coconut was invaded in to India. Wide spread infestation has been noticed in all the coconut growing districts of Tamil Nadu. It caused huge crisis to farmers due to its polyphagous nature. Integrated Pest Management strategies play key role in managing this pest. Conservation of biological control agents will help us to keep this pest under check.

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