Integrated management of rugose spiralling whitefly in coconut

The coconut, is referred as the "Karpaka viruksha", is damaged by more than 800 insects. However, a newly spreading sap-sucking insect pest called the rugose spiralling whitefly (RSW) (*Aleurodicus rugioperculatus*) has been found to be attacking in large numbers on coconut recently. RSW was invaded in to Florida in the United States during 2009. It was noticed in a severe form in coconut palms at Pollachi, Coimbatore district, Tamil Nadu, India during August- September, 2016 subsequently to the other parts of the country. Both nymphs and adult whitefly suck the sap by their sucking mouthpart, siphon out coconut sap by selective feeding from the abaxial surface of the coconut leaflets.

Symptoms of damage

- Presence of irregular, white, waxy spirals on the undersides of fronds, especially around the egg masses
- The sticky honeydew excreted by the whiteflies drops on the lower fronds provides a substrate for sooty mould to grow, resulting in black, dusty patches on leaves and other surfaces. The honeydew can be a nuisance, attracting ants and wasps, and the sooty mould can disrupt photosynthesis.
- Sap-sucking by the whiteflies cause yellowing, drooping of fronds and eventually drop prematurely.
- In severe cases, the whitefly infestation can lead to the drying of leaves and leaflets.
- Adult whiteflies can produce a fluffy and white dust, especially during heavy infestations.
- Heavy infestations can weaken plants, causing a decline in vigor and giving a sickening appearance.

Alternative food crops of rugose spiralling whiteflies

RSW attack and damage about 250 other plants, including coconut, guava, cocoa, lemon, sapota, banana, mung bean, hibiscus, nutmeg, custard apple, jackfruit, wild mango, papaya, mango, curry leaf, yan, ornamental palm, neerium, cassava, parthenium and ornamental plants are more important hosts.

Life stages

Egg: Female whiteflies lay oval-shaped eggs in a spiral form, on the underside of the leaves of coconut palm. The eggs are yellow in colour. These eggs are covered with a white waxy coating.

Nymphs: The nymphs hatch in 2-3 days and have two stages. In the first stage, they are round in shape, with a flat needle-like mouthpart. They are also motile.

Pupae: The pupae are slightly elongated, non-motile form. They are about 15 mm long and pale yellow in colour. They also produce thick white fluff-like filaments.

Adult: The adult emerges from pupae after 10 days. Adults are winged. It takes about 25-30 days to develop from eggs into adult. The adults are found in groups at the bottom of the fronds. A pincer-like structure can be seen on the posterior tip of the male whitefly. These whiteflies are 3 times larger than the cotton-infesting whiteflies.

Infestation of Rugose spiralling whitefly in different varieties of coconut

Rugose spiralling whitefly infestation was high in all dwarf and hybrids compared to tall varieties. The Rugose spiralling whitefly infestation was high in Chowghat Orange Dwarf (COD), followed by Malaysian Yellow Dwarf (MYD), Malaysian Orange Dwarf (MOD), Chowghat Green Dwarf (CGD), Kenthali Dwarf (KTD). The infestation was moderate in Dwarf X Tall, Tall x Dwarf hybrids and low in Tall x Tall hybrid and very low in tall varieties

Integrated management of whitefly

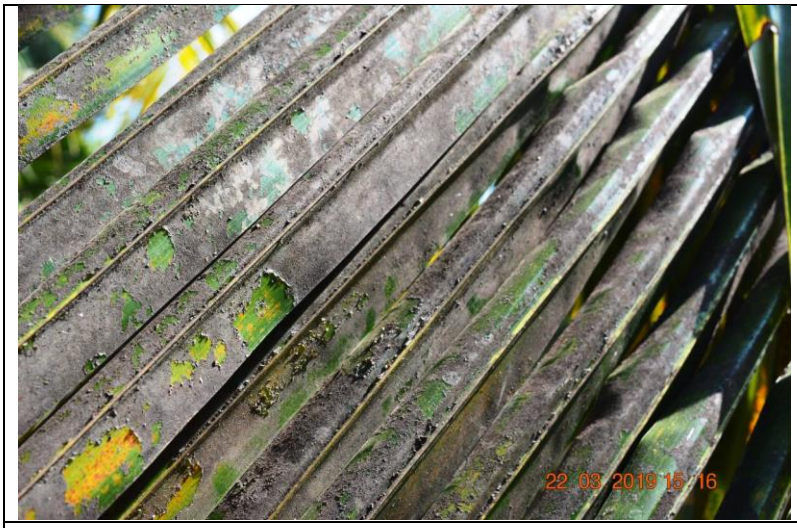
- Spraying of water forcibly on the under surface of the fronds to distort the whitefly population.
- For monitoring and mass trapping of the adults, setup yellow sticky traps (size 5x1.5 feet) smeared with caster oil @ 20 Nos./ac in between the trees or on the trunk portion smeared with castor oil. Apply castor oil adhesive as and when required. Along with this use tube light to attract the adults, according to the farmers experience it is working well.
- Release of *Encarsia guadeloupae* parasitoids by stapling leaf again containing the RSW puparia of rugose spiralling whitefly (parasitized by *Encarsia*) under the coconut leaflets @ 1 leaf bit / 10 palms.
- To encourage the colonisation and multiplication of *Encarsia guadeloupae* in coconut garden, *Canna indica*, banana and Annona plants may be grown as inter crop @ 20-25 numbers/Ac in between the coconut palms.
- Release of predator, green lace wing, *Chrysoperla* or *Apertochrysa astur* @ 400 Nos. eggs /ac which can be attached on the infested fronds.
- Mix neem oil @5 ml + sticking agent 1ml per liter of water and spay the fluid should be directed towards the lower fronds.
- Spraying of insecticides would highly suppress the population buildup of all the natural enemies hence, pesticide sprays are to be strictly avoided.
- 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.
- Apply recommended dose of fertilizer and water for fast recovery.

Eggs of rugose spiralling whitefly

Nymphs

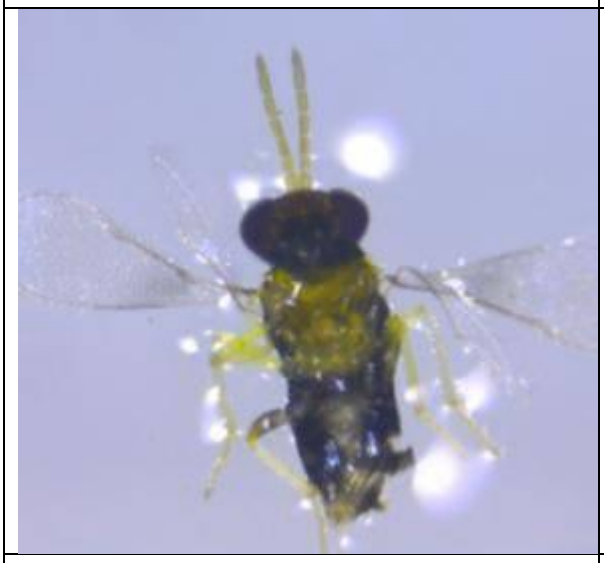
Whitefly adults

Severely damaged leaves

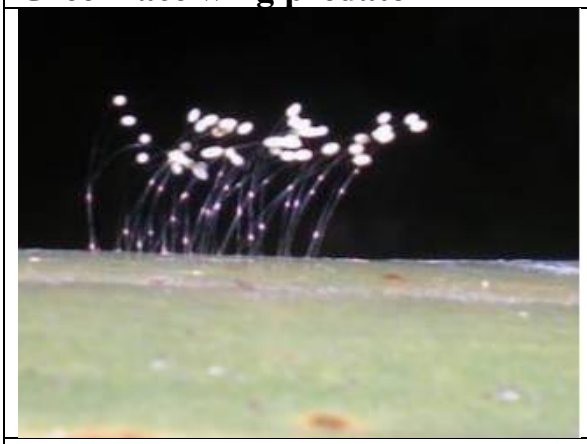


Sooty mould on the fronds

Yellow sticky traps

Jet water spraying on the under surface of fronds	Release of *(Encarsia quadeloupae)* in the field
	
Encarsia guadelopae **adults**	***Encarsia quadeloupae*** **parasitised whitefly puparia**

Green lace wing predator

	
Eggs	Grubs
	
Pupae	adults

Tamil Nadu Agricultural University Vice Chancellor and Director of Centre of Plant Protection Studies addressing the farmers gatherings on management of RSW