

Bio-cleansing of coconut palms infested by **Rugose spiralling whitefly**

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Rugose Spiralling Whitefly (RSW), *Aleurodicus rugipericulatus* Martin, an invasive pest of Neotropical origin was first reported in India on coconut from Palakkad, Kerala (10.7402 N ; 76.8346 E) and Pollachi, Tamil Nadu (10.4851 N ; 76.9658 E) during July-August 2016. RSW feeds from under surface of palm leaflets and honeydew excrements get deposited on the underlying palm leaflets and understorey crops attracting sooty mould (*Leptotyphium* sp.) encrustations. Such presence of sooty mould is the indicator of pest infestation and these deposits of sooty mould interfere with photosynthetic efficiency of palms. Coconut is the most preferred host of RSW followed by banana. Egg spirals are recorded

on many intercrops grown along with coconut in homesteads.

Import of planting materials without proper quarantine in the era of liberalized trade could have paved entry of this invasive pest into our country. High maximum temperature (>33°C) coupled with rainfall deficit (<50 mm) and low relative humidity (<55%) favoured gradient outbreak of this pest. It is primarily suppressed through biological control by the aphelinid parasitoids, *Encarsia guadeloupae* and *Encarsia dispersa* with parasitism recorded as high as 80%. Therefore, use of any insecticides is not recommended for the management of RSW (Chandrika Mohan et al. 2017).

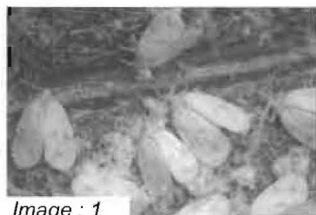


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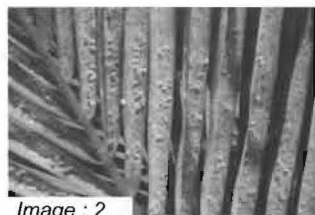


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Image : 4

Sooty mould scavenging beetle, *Leiochrinus nilgirianus*

For the first time at the International level, scientists from ICAR-Central Plantation Crops Research Institute, and ICAR-National Research Centre on Banana, Trichy have reported the occurrence of a sooty mould scavenging beetle, *Leiochrinus nilgirianus* Kaszab (Coleoptera : Tenebrionidae) on coconut palms infested by the rugose spiralling whitefly (RSW) (Josephraj Kumar et al., 2018). This beetle, which resembles the predatory lady beetle in appearance, are found to feed on the sooty mould deposits developed on the honey dew excreted by the rugose spiralling whitefly. *L. nilgirianus* could be first located from sooty mould laden coconut palms at ICAR-CPCRI, Regional Station, Kayamkulam during July-August period which coincided with the south-west monsoon phase providing high humidity and morning wetness, that favoured the accurate niche for enhanced survival and feeding.



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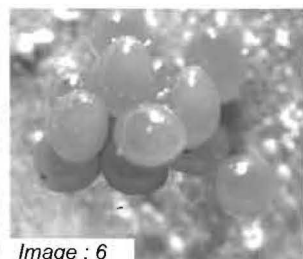


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All stages of the beetles viz., eggs, grubs, pupae and adult beetles were found on the palm leaflets and other intercrops with sooty mould. Generally, the grubs and adult *L. nilgirianus* beetles are restricted on the under surface of the leaves. But they move on

to the upper surface of the leaves with sooty mould deposits during early morning hours with dew drops and feed on the sooty mould. Eggs of this beetle are purplish, laid in groups and emerging neonates are transparent and turn black, assume spherical and

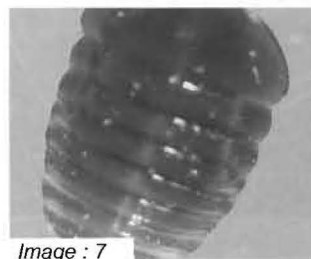


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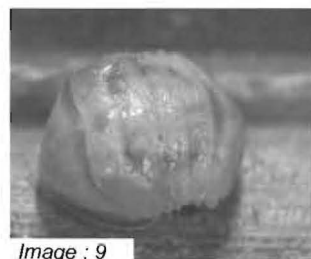


Image : 9



Image : 10

cylindrical shapes in movement due to the presence of elastic inter-segmental membrane. Creamish patches are developed during pre-pupating stages and pupae with distinct cream patches are also confined on the under surface of palm leaflet indicating its photosensitiveness. During observations, more than five beetles (Average 2.07 ± 0.9) and immature grubs could be noticed on sooty mould laden leaves. Bristle-like tarsomeres and tarsal claws of adult beetles encouraged effective adhesion, scooping of mould and swift movement on fungal growth. *L. nilgirianus*

Image 1 : - Microscopic view of RSW

Image 2 : - RSW colony on infested leaf

Image 3 : - *Encarsia guadeloupae*

Image 4 : - Sooty mould laden palm leaflets

Image 5 : - *Leiochrinus nilgirianus*

Image 6 : - Purplish eggs

Image 7 : - Grub

Image 8 : - Pre-pupa

Image 9 : - Pupa

Image 10 : - Adult beetle

“**Import of planting materials without proper quarantine in the era of liberalized trade could have paved entry of whitefly into our country. High maximum temperature (>33°C) coupled with rainfall deficit (<50 mm) and low relative humidity (<55%) favoured its gradient outbreak.**”

population was found very high and subsequently got reduced with the decline in RSW population and the sooty mould deposits. Mouth parts and gut lining of the beetle with fungal deposits could be located confirming the scavenging action of the beetle.

Though ecosystem services provided by insects include food for wildlife, pest destruction, crop pollination, scavenging, etc. which is estimated at around \$57 billion in the United States of America

alone, a thorough cleaning action on an economically significant crop like coconut is reported for the first time at global level. Habitat conservation of the sooty mould feeding scavenger beetle, *L. nilgiranus* in the palm ecosystem is very crucial and the conducive weather factors of high humidity and high rainfall prevailing in Kerala during monsoon phase are key factors for the survival and feeding efficiency of the beetle. Though report on scavenging action by insects such as termites disintegrating wood, springtail decomposing dead larvae and fly maggots feeding on dead animals exist in nature, the present instance appears to be unique in which sooty mould deposition is totally cleared by an insect scavenger in palms.

In addition to flaking out the sooty mould fungus by spraying 1% starch solution, which is currently recommended, conserving *L. nilgiranus* is a good strategy to improve palm health by clearing sooty mould encrustations. Conservation of *E. guadeloupae* by limited or zero pesticide usage coupled with *in situ* habitat preservation of scavenger beetles (*L. nilgiranus*) appears to be a very effective strategy that would help in controlling *A. rugioperculatus* and in clearing sooty mould from coconut palms at no cost in the most natural and eco-friendly manner avoiding chemical management options and other expensive methods. Further, the sustenance of Leiochrini beetle for scavenging action can be encouraged under the context of Organic Agriculture policy of Government of Kerala in vogue. ■