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EMERGENCE OF RUGOSE SPIRALLING WHITEFLY AS A MAJOR THREAT TO COCONUT PLANTATIONS AND HORTICULTURAL CROPS

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Coconut, *Cocos nucifera* L. (Arecaceae) is an important plantation crop grown mainly in the tropical and subtropical areas of the world and most of the farmers depend on coconut both directly or indirectly for their livelihood. India is one of the leaders in coconut farming and stands third biggest coconut producing country worldwide. Amongst coconut producing states, Tamil Nadu, Kerala, Karnataka and Andhra Pradesh are the leading coconut producing states which account for more than 90% of coconut production.

Pest infestation is one of the main constraints for attaining better production and productivity in coconut. Coconut Eriophyid mite, *Aceria guerreronis* Keifer (Eriophyidae: Acarina), rhinoceros beetle, *Oryctes rhinoceros* L (Coleoptera: Scarabaieidae), pink palm weevil, *Rhynchophorus ferrugineus* Olivier (Coleoptera: Curculionidae), black headed caterpillar, *Opisina arenosella* Walker (Lepidoptera: Oecophoridae) and white-grub, *Leucopholis coneophora* Burmeister (Coleoptera: Scarabaieidae) are considered as major pests of coconut.

Rugose Spiralling Whitefly (RSW), *Aleurodicus rugioperculatus* Martin (Hemiptera: Aleyrodidae) a new invasive pest was identified in India. Its invasiveness in India was recorded by the ICAR- National Bureau of Agricultural Insect resources, Bengaluru's scientists on coconut plantations at pollachi, Tamil Nadu (Sundararaj and Selvaraj, 2017) and subsequently, it has spread to districts of Karnataka, Kerala, Andhra Pradesh, Goa, Assam and West Bengal (Selvaraj *et al.*, 2017 & 2019) and it was recently located in Lakshadweep islands, coastal districts of Maharashtra, Gujarat, Telangana, Odisha, Chhattisgarh and few districts of Meghalaya and Assam. The incidence and infestation of the RSW was also recorded on many different Horticultural crops like oil palm, banana, guava, sapota, cashew nut etc. It has became

potential threat to Arecaceae family crops attacking more than 120 crops like ornamentals, palms, weeds, native and invasive plant species (stocks and Hodges, 2012).

Distribution

RSW is well distributed along coastal tracts, along the state, national highways, isolated gardens close to water bodies, back water regions and even in islands. The most insidious spread of RSW in India is probably mediated with the aid of people through the movement of infested seedlings and plant materials. Transportation of infested nursery planting material is number one thing which plays primary role in speedy dispersal of this pest within quick span of time.

Host Plants

RSW is a polyphagous pest, in India it was reported to feed approximately 44 host plants especially coconut, oil palm, banana, mango, sapota, guava, cashew, ramphal, maize, Indian almond, water apple, jack fruit and ornamental plants *viz*., bottle palm, Indian shot, false fowl of paradise and butterfly palm.

Biology

Egg stage: Adult female lays eggs in concentric circular or loose spiral pattern on the ventral surface of the leaves, on leaf petioles, stems and fruits. Eggs are elliptical and yellowish in colour, 0.3 mm long, translucent with a short stalk and are associated with abnormal spiralling deposits of white flocculent wax surrounding each egg in a semi-circular spiralling manner.

Nymph stage: The first instar nymphs are known as crawlers, which are only mobile stage with functional legs and these are transparent mild to golden yellowish in colour devoid of wax. second instar nymphs are immobile, fringed with marginal wax along the transverse grooves on their dorsum and the compound pores produce glassy wax filaments. They are transparent light to golden yellowish and bigger in size compared to first instar.

Third instar nymphs have numerous evenly spread short, glass rods like waxy filaments along the sides of body. Fourth instar nymphs are protected with copious quantity of opaque white waxy material dorsally as tufts.

Adult stage: Adults are about 3 times larger than the present invasive spiralling whitefly, *Aleurodicus dispersus* and are lethargic by nature. Adults can be distinguished by the presence

of a pair of irregular light brown bands across the wings. Males have long pincer-like structures at the distal ends of the abdomen.

Nature of Damage and Economic Significance

Both nymphs and adults suck the sap by using their piercing and sucking type of mouth parts from the abaxial surface of the coconut leaflets. De-sapping by RSW reduces the plant growth due to removal of water and vitamins. Massive feeding of the insect also leads in excretion of honey dew which subsequently gets deposited on the upper surface, lower surface of the leaves and on other feeding areas. Honey dew excrement, encourages the development of the fungus, *Capnodium ramosum* as a black encrustation, which causes the disfigurement of leaves, affecting the photosynthetic performance of the plant. Severe infestation causes stunted growth, premature leaf drying, dropping of fronds, immature nut fall and malformed nuts. White mealy waxy flocculent material produced by nymphs and adults causes nuisance to humans in severely infested areas.

IPM practices for the management of Rugose Spiralling Whitefly

Cultural practices:

- Field sanitation removal of weeds and other alternate host plants.
- Prevent transportation of infected planting materials.
- Provide balanced N:P:K fertilisers.
- Avoid high density planting.
- Intercropping with banana, pearl millet, cocoa and nutmeg to boost parasitoid activity in infected fields.
- Grow marigold as a intercrop to suppress the whitefly population. The limonene present in marigold flowers may repel the whiteflies. (Anon, 2019).

Mechanical practices:

- Spray water forcibly on the underneath surface of the fronds or on infected leaves to distort
- the whitefly population.
- Installation of yellow sticky traps.
- Periodically burn the badly infected leaves.

Biological practices:

- Field release of *Encarsia guadeloupae* parasitoids by stapling the leaf with RSW puparia parasitized with *E. guadeloupae*. To encourage the colonisation and multiplication of *E. guadeloupae* in Indian shot, banana and annona flowers can be grown as intercrop.
- Release predator lace wing, *Chrysoperla spp*. or *Apertochrysa astur* @ 400 eggs/acre.
- Release sooty mildew feeding scavenging beetles, *Leiochrinus nilgirianus* Kaszab 1946 (Tenebrionidae : Coleoptera).
- Spraying of Entomopathogenic fungus, *Isaria fumosorosea* on the RSW causes yellow muscardine disease leading to mortality of the pest (Sandhu *et al*., 2012).

Chemical practices:

- Apply of neem oil @10000 ppm by combining with washing powder to reduce RSW population (stocks & Hodges, 2012).

Conclusion and Future prospects

Rugose spiralling whitefly emerging as a severe threat to wide range of host plants, specifically coconut, oil palm, banana, citrus, and ornamental species. Its rapid reproduction, wide host range, and quick spread make it hard to control once established. While RSW is a significant threat, the pest is effectively managed through timely biological interventions and ecological monitoring. Several parasitoids like *Encarsia guadeloupae* and *Chrysoperla*, Coccinellid predators have already shown effective control potential towards RSW. In areas, where these natural enemies establish well, RSW populations often drop significantly. Future pest infestation and damage will likely depend on how efficiently those biological controls are conserved and deployed.

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