Ecofriendly management of invasive Coconut Rugose spiralling whitefly in Tamil Nadu

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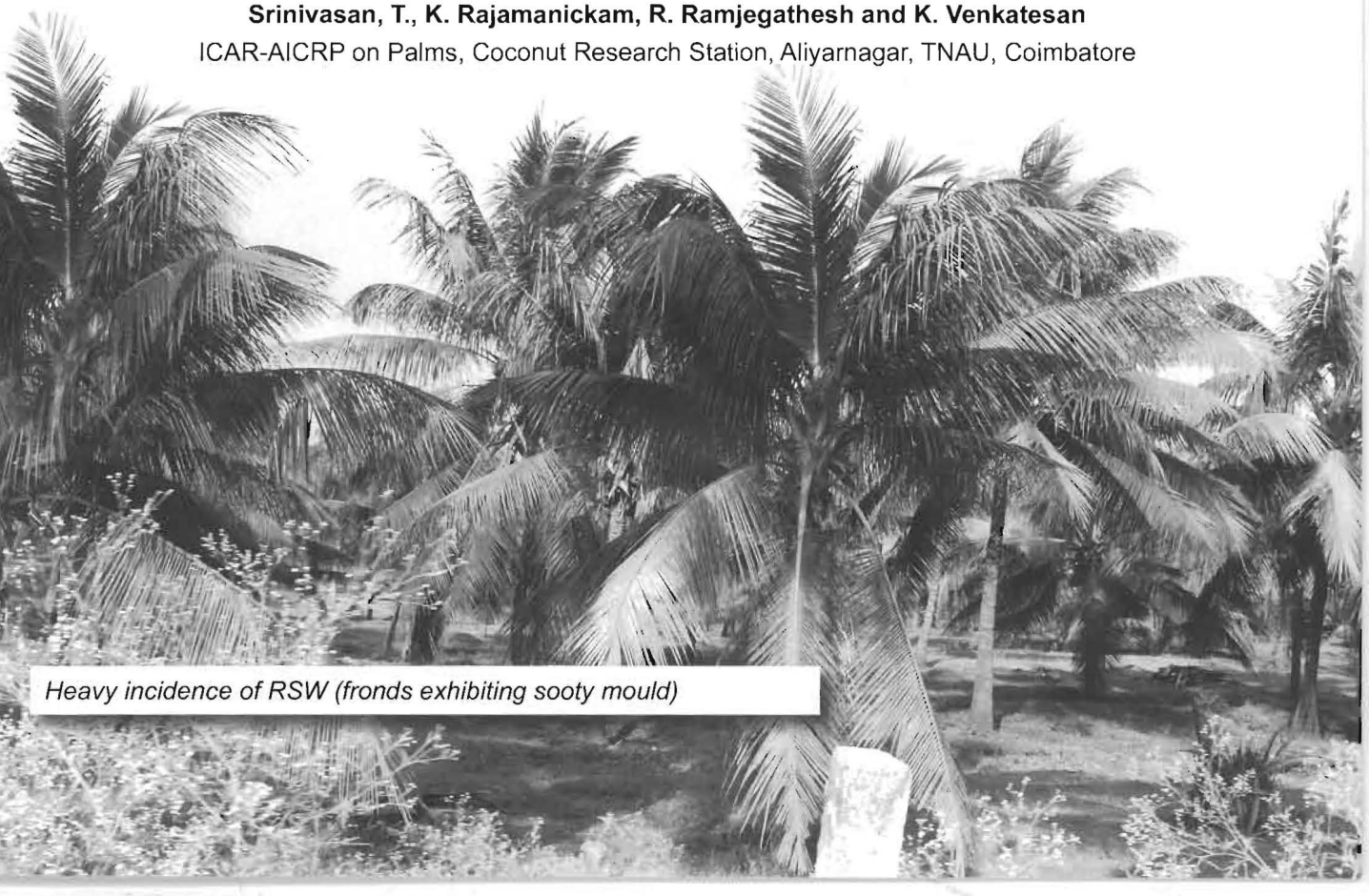
Invasive Rugose spiralling whitefly

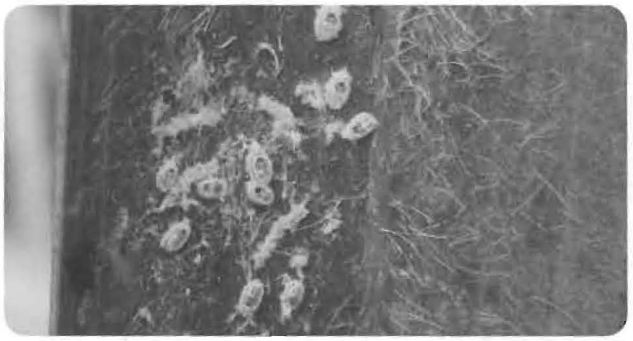
Rugose spiralling whitefly (RSW), Aleurodicus rugioperculatus Martin is an invasive species of whitefly belonging to the family Aleyrodidae (Order: Hemiptera). It is widely referred to as gumbo limbo spiralling whitefly and was first reported in coconut (Cocos nucifera L.) during 2004 in Belize, Central America and in South Florida, United States in 2009. It was reported in Pollachi tract (10.491°N; 76.980°E), Coimbatore district, Tamil Nadu during August, 2016.

Females of the RSW lay creamy yellow coloured eggs on the under surface of the leaves in a spiral manner. The eggs upon hatching out into nymphs, develop by sucking the plant sap from the under surface of the leaves. Initially, the lowermost fronds are the ones which are colonized by the RSW adults. Persistent sucking by the RSW results in

> As an invasive pest, RSW poses a threat to coconut plantations in South India. Continuous surveillance, non-chemical approaches and conservation of the natural enemies are the need of the hour to contain the pest.



Heavy incidence of RSW (fronds exhibiting sooty mould)



Nymphs of RSW showing emergence holes made by the Encarsia parasitoid

Yellow sticky sheets on palm tree trunks

yellowish white patches on the adaxial surface of the leaves, which later coalesce to larger areas of yellowish discolouration. The adults excrete honey dew secretions that drips on the abaxial surface of the leaves as well as on the adaxial surface of the underlying fronds. Establishment of a fungus Capnodium takes place, wherever the honey dew secretions are present, exhibiting a charcoal black appearance which could be seen even from a longer distance. Initial feeding and honey dew excretion leads to sooty mold deposition on the lowermost 6-8 fronds. Under severe population build up, the whitefly population, tend to colonise even on the middle whorls leaving the central spindle leaves alone. Heavy honey dew dripping by RSW adults lead to the presence of the black sooty mould even on the underlying vegetation and grass cover.

Host range and varietal preference

The RSW has been known to attack about 118 hosts including cultivated crops and weed flora. Several host plats were found to harbor different life stages of RSW of which banana, bhendi, sapota, custard apple, citrus, nutmeg, hibiscus, guava, etc. supported the full life cycle of RSW viz., egg, nymph and adult. However, arecanut, mango, cassava, parthenium and pepper harboured only the egg stages of RSW which revealed that these hosts did not support the complete development of the invasive pest. Observation on the extent of damage in different varieties also revealed that dwarf varieties like Chowghat Orange Dwarf, Malayan Yellow Dwarf and Malayan Green Dwarf, and Dwarf x Tall hybrids suffered severe attack while low levels of infestation was noticed in tall varieties like West Coast Tall and Arasampatti Tall.

Influence of weather factors

Weather factors appeared to assist the spread of the pest. Compared to 2015, the mean maximum temperature increased by 0.9 °C during 2016 while the morning and evening relative humidity and rainfall decreased by 5.0 per cent, 9.1 per cent and 35 mm, respectively. As much as 337 mm rainfall was received in June-September, 2015 as against 102 mm in 2016, accounting for an approximate 69% reduction in rainfall. The prolonged dry spell, except for a few intermittent showers, from June 2016 onwards could also be one of the predisposing factors for the proliferation and quick dispersal of this invasive pest.

Natural enemy complex

An array of natural enemy fauna including predators viz., coccinellids and chrysopids and an aphelinid parasitoid, Encarsia guadeloupae were found in abundance and contributed for the suppression of the RSW population in an effective manner. In some of the surveyed gardens more

Heavily infested Chowghat Orange Dwarf (September 2016) at CRS, Aliyarnagar

Farmers observing the parasitism by Encarsia under microscope at TK Pudur, Polachi (North) block, Coimbatore district

Awareness programme concucted at CRS, Aliyarnagar

than 80 per cent parasitism by E. guadeloupae was recorded indicating the superior role of this aphelinid parasitoid in bringing down the RSW population.

Ecofriendly management of RSW

As soon as the population build up of the RSW was noticed during 2016, a set of management measures were formulated based on the previous experience with the incidence of spiraling whitefly, Aleurodicus disperses in guava, tapioca, etc. The IPM measures included, installation of yellow sticky traps smeared with castor oil @ 10 / acre for monitoring the RSW adult population, spraying water forcibly on the under surface of the leaves, spraying with neem based botanicals for inhibiting the growth and development of RSW, release of Chrysoperla @ 1000/ ha and distribution of coconut leaflets containing parasitized (by Encarsia guadeloupae) nymphs. These IPM measures were propagandized through various awareness meetings and sensitization programmes. As of now, a total of 3500 farmers in Coimbatore and Tiruppur districts were provided with Encarsia parasitoids and the results have been encouraging thus far. Releasing the parasitoids in infested gardens led to drastic decrease in population from more than 150 adults per leaflet to less than 25 adults per leaflet. Simultaneously parasitisation by Encarsia also increased to more than 70 % (from an initial 10-20 %) within a span of six months.

Conclusion

As an invasive pest in the sub-continent, RSW poses a threat to coconut plantations in South India. However, remarkable levels of natural parasitism by E. guadeloupae coupled with the abundance of coccinellid and chrysopid predators, is keeping the pest under check. Therefore, continuous surveillance, non-chemical approaches and conservation of the natural enemies are the need of the hour to contain the pest. Awareness among the coconut farmers by CRS Aliyarnagar through interactive meetings and awareness-cum- sensitization campaigns to about 1200 farmers led to minimal use of pesticides in the ecosystem thereby build up of natural enemies which are keeping the RSW population under check. The extent of yield loss due to RSW attack in coconut plantations, its biology and ecology in relation to its predators and parasitoids, role of weather factors in the build-up of the pest as well as natural enemies are the areas where the present research is focused upon.

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