Good Agricultural Practices

For the Management of Rugose Spiraling Whitefly

भाकृअनुप - भारतीय तेल ताड़ अनुसंधान संस्थान

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Rugose Spiraling Whitefly, *Aleurodicus rugioperculatus* is an invasive pest to India. The incidence and intensity of the pest is increasing every year since its entry into the country i.e. during 2016 in Tamil Nadu and Kerala and 2017 in Andhra Pradesh causing severe losses to the growth of the plants. Apart from sucking the sap and thereby draining the nutrients from the plants, the honeydew secretion by the pest is making nuisance by attracting sooty mold fungus to grow over it which forms as a black layer (Fig. 1) . This makes the plants appear black hindering the photosynthetic activity. Though the quantification of the losses due to the pest infestation has not been done for any crop, it is essential to draw management practices to curb the incidence. Since the pest is new to the country and that too an invasive species, no foolproof readymade information is available on its management. The continuous efforts carried out in various research institutes on its management yielded fruitful results and are worth to be practiced for its successful mitigation. The pest can be curbed to below threshold levels if all the below mentioned practices are followed in an integrated manner.

Fig. 1: Black layer on oil palm leaves

1. Since the pest is a migratory one from one plant and one area to another, utmost care is needed while purchasing and transporting the planting material. As the pest is a tiny sized one, it is essential to check thoroughly each and every plant for the presence of the pest (Fig. 2). Only those plants which are free from the pest infestation (having no single spiral of eggs) should be procured / planted. Even after planting, continuous supervision needs to be carried out at regular intervals for the skipped ones, if any.

Fig. 2: Rugose Spiraling Whitefly

2. To arrest the migration of the pest, it is recommended to stop procuring the plants from already infested areas till such time the incidence is subsided.

3. Growing marigold plants all around the garden or interspersed within the target crops is a good cultural practice to suppress the whitefly. The limonene content present in these flowers may repel the flies and do not kill them, thus no pest resistance and no negative impact on beneficial insects (Fig. 3).

Fig. 3: Marigold as Cover crop

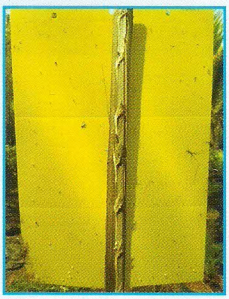

Fig. 4: Sticky glue traps

4. Since most of the green crops including weeds in the vicinity of the infested plants are acting as collateral hosts for the pest development, it is advised to remove them or take control measures on these too.

5. Hanging sticky glue traps of green or yellow colour in the infested gardens are found effective compared to other ones (white) in attracting and managing the pest population. The adult flies that come out during dusk are attracted to these traps and ultimately get killed. Once the trap is full it needs to be replaced with a new one (Fig. 4).

6. Applying castor oil on the yellow or green coloured tarpaulin sheets of 1.5 to 2 feet height size and wrapping them on the stems of coconut/oil palm palms is also a good and cost effective practice to suppress the adult population (Fig. 5). These traps need to be serviced at alternate days by wiping the sheets to remove the trapped adults and reapplying castor oil.

7. Application of neem oil 10000 ppm (Fig. 6) concentration mixed with detergent powder like RIN, SURF, WHEEL, NIRMA etc. is found to be a good and effective practice in bringing down the pest population. The detergent

Fig. 5: Cost effective glue traps

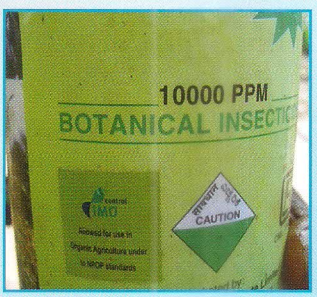

Fig. 6: Botanical Insecticide

powder is observed dissolving the waxy material present over the pest stages and makes them exposed to biotic and abiotic stress. The neem oil is found acting over the exposed immature stages of the pest and makes them suppressed. The other concentrations of neem oil (1000 and 1500 ppm) that are available in the market may also be useful but need higher dose that may increase the cost of application.

8. Bioagents namely parasitoids, predators and entomopathogenic fungi are found effective to suppress the pest during winter and rainy seasons but their efficacy is found reduced during high temperature periods like summer. The nymphal parasitoid, *Encarsia guadeloupe* that was collected from the spiraling whitefly, *Aleurodicus dispersus* infested areas is found an effective parasitoid on Rugose Spiraling Whitefly also. These parasitoids that were collected from already infested areas of Kerala and Tamil Nadu proved effective when released in Andhra Pradesh causing more than 20% parasitism to the second instar nymphs (Fig. 7). However their efficacy was found diminished with the increase in temperatures.

Fig. 7: Parasitized nymphs of RSW

9. The locally available neuropteran predator *Dichochrysa astur* (Fig. 8) is found effective causing mortality to the pest population by eating the egg stages. The typical symptom of its feeding on pest is seen with the eaten carcasses on its back making it as hump back. These predators are being multiplied at HRS (Dr YSRHU), Ambajipet and supplied to the farmers for further release.

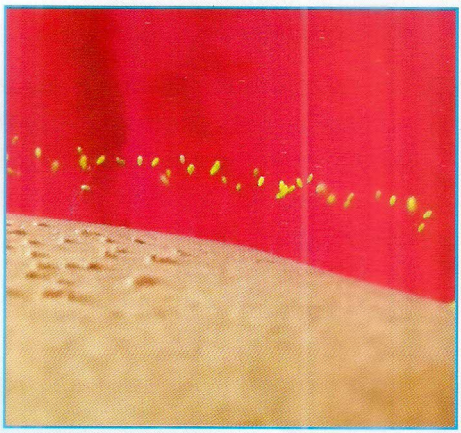

Fig. 8: Eggs of Predator

10. The ICAR- IIOPR, Pedavegi has found the effectiveness of fungal microbial organism *Isaria fumosorosea* (Fig. 9) (strain of ICAR-NBAIR, Bengaluru) on the pest population. It is found killing the pest population during all the

seasons. Since it is a microbial fungicide, pollution to the environment and resurgence problems are not cropped up. The multiplication procedures at both laboratory and field levels were standardized for getting maximum number of spores per unit area.

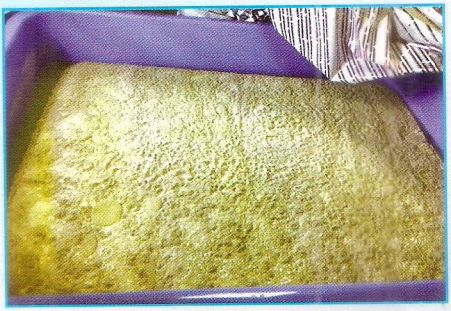

Fig. 9: Isaria fumosorosea fungus

Fig. 10: Fungus multiplication in Laboratory

11. Methodologies that need to be followed for the fungus multiplication in laboratory (Fig. 10) on various media were standardized using locally available material. This paves the way for following by all the interested persons with little investment.

12. The commercial multiplication of the fungus in the farmers' fields using mother culture supplied by this Institute as well as various laboratories has been standardized by using simple materials like starch powder and jaggery (Fig. 11).

Fig. 11: Commercial multiplication of fungus

13. The fungus multiplication is made easy to carry out by farmers themselves in their fields by supplying mother culture having spore count of more than 100 X 10^8. The fungus is found fast developed in jaggery and starch materials at a short time of 15 days. Re-inoculation studies carried out using the infected RSW confirms the mortality of the pest due to the fungus *Isaria fumosorosea* only. Hence it is also recommended to include in IPM practices for RSW

14. The application methods were also standardized by comparing various sprayers. Use of turbo sprayer (Fig. 12) is found very effective in getting maximum mortality of the pest compared to traditional sprayers like knapsack, foot pumps and power operated ones.

15. Three applications of the developed culture at weekly intervals along with detergent powders are effective in controlling the pest population and hence recommended.
16. Awareness campaigns / meetings to make the farmers know about the pest and its management need to be organized in the pest infested areas at frequent intervals to disseminate the knowhow on management practices (Fig. 13) .
17. Demonstration of the technologies that are available on the mitigation of the pest need to be conducted in the infested gardens so that the nearby farmers can visit and gain the knowledge on management.

Fig. 12: Turbo spraying

Fig. 13: Awareness campaigns

18. Since insecticidal sprays may pose the problem of pest resurgence by killing the natural enemies, it may be avoided. This will give a chance for the natural enemy build up in the garden.
19. Use of insect growth regulating chemicals (chitin inhibitors) like Buprofezin that was proved effective in USA when used in combination with *Isaria fumosorosea* fungus, may also be a good practice to follow.
20. Hygienic conditions need to be maintained in the gardens as well as in the Isaria fungus multiplication areas for effective management of the pest.

By following the above mentioned practices in an integrated manner, the whitefly menace can be checked effectively.

Acknowledgements

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