

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; 10(1): 1212-1215
www.biochemjournal.com
Received: 02-11-2025
Accepted: 07-12-2025

Thalluri Revanth
M.Sc Scholar, Department of
Entomology, Odisha
University of Agriculture and
Technology, Bhubaneswar,
Odisha, India

Jayaraj Padhi
Professor, Department of
Entomology, Odisha
University of Agriculture and
Technology, Bhubaneswar,
Odisha, India

Ajit Kumar Sahoo
Department of Fruit Science
and Horticulture Technology,
Odisha University of
Agriculture and Technology,
Bhubaneswar, Odisha, India

Yogesh Kumar HD
Ph.D. Scholar, Department of
Entomology, Odisha
University of Agriculture and
Technology, Bhubaneswar,
Odisha, India

Corresponding Author:
Thalluri Revanth
M.Sc Scholar, Department of
Entomology, Odisha
University of Agriculture and
Technology, Bhubaneswar,
Odisha, India

Eco-friendly management of rugose spiralling whitefly, *Aleurodicus rugioperculatus* Martin in coconut

Thalluri Revanth, Jayaraj Padhi, Ajit Kumar Sahoo and Yogesh Kumar HD

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i1o.7234>

Abstract

Eco-friendly management of rugose spiralling whitefly on coconut at All India Coordinated Research Project on Palms under Odisha University of Agriculture and Technology, Bhubaneswar revealed that the combination of yellow sticky trap + neem oil (10,000 ppm @ 1 ml/l) along with 10 g detergent + *Isaria fumosorosea* @ 5 ml/l proved to be the best treatment. Based on the efficacy of various management practices followed the descending order of RSW management is Combination treatment > Spraying with *Isaria fumosorosea* @ 5 ml/l > Azadirachtin 10,000 ppm @ 1 ml/l along with 10 g detergent > Forceful water spray @ 10 l/plant > Yellow sticky trap.

Keywords: Rugose spiralling whitefly, yellow sticky trap, neem oil, *Isaria fumosorosea*, forceful water spray, damage intensity

Introduction

Coconut, *Cocos nucifera* L. is a member of Arecaceae family, popularly known as 'Tree of life', 'Tree of heaven' and 'Kalpavriksha'. Coconut palms are grown in more than 90 countries and territories around the world. The majority of global production takes place in tropical Asia with Indonesia, Philippines and India accounting for more than 72% of total output. The highest area, production and productivity of coconut in India were recorded in Kerala, Karnataka and Tamil Nadu, respectively (Raghavi *et al.*, 2019). Coconut crop is necessary for human nutrition as well as the economic needs of those who rely on their marketing (Kumara and Kapoor, 2010) [5].

Rugose spiralling whitefly (RSW), *Aleurodicus rugioperculatus* Martin (Aleyrodidae: Hemiptera) is a recent invasive pest found infesting on 21 hosts belonging to 15 botanical families in a survey conducted in Tamil Nadu. Coconut and banana were the most preferred hosts for RSW (Elango *et al.*, 2019) [2].

The RSW infestation on coconut ranged from 20 to 35% in Mangaluru and Udupi districts of Karnataka (Selvaraj *et al.*, 2017) [7]. The RSW infestation ranged from 75.85 to 95.00% on coconut, whereas the incidence ranged from 81.42 to 100.00% in West Godavari district of Andhra Pradesh (Sushmitha *et al.*, 2020) [9].

Rugose whitefly feeding causes stress to the host plant by withdrawing water and nutrients and producing honeydew, which covers the bottom leaves and promotes growth of sooty mould.

The ecofriendly management strategy advised very efficiently and launched successfully by resorting to no pesticide spray (pesticide holiday) by ICAR-Central Plantation Crops Research Institute, Kasaragod turned out to a real success. Ecofriendly management practices are adopted to minimize the pest resurgence, management cost, insecticide residue and also to promote the natural enemy fauna. Since, RSW is recently invaded; research on management practices to control this devastating pest is under way. In view of all the above constraints the present research was conducted to find out the suitable ecofriendly management to rugose spiralling whitefly in Bhubaneswar.

Materials and Methods

A field experiment was carried out at All India Coordinated Research Project (AICRP) on Palms under Odisha University of Agriculture and Technology (OUAT), Bhubaneswar during 2020 and 2021. The experiment on eco-friendly management of RSW in coconut was laid out in randomised block design (RBD) with six treatments and four replications including a control. Coconut palms of Sakthigopal Local, 7 years old with 7.5-8.0 m height was selected for the experiment. Each replication consists of two plants. All the intercultural operations like hoeing and

weeding were done as per the recommended package of practices. 10 kg of FYM was applied for each palm. Chemical fertilizers were applied with recommended dose of 500: 320: 1200 (N:P:K) g/palm in the form of urea, single super phosphate and muriate of potash.

Two biopesticides, one water jet spray, yellow sticky trap, combination of two biopesticides along with yellow sticky trap and control were taken up to evaluate the efficacy of eco-friendly management of rugose spiralling whitefly in coconut (Table 1).

Table 1: Details of the treatments used to manage rugose spiralling whitefly.

Treatment No.	Treatment details
T ₁	Yellow sticky traps
T ₂	Azadirachtin 10,000 ppm @ 1 ml/l along with detergent powder @ 10 g/l
T ₃	Spraying of entomopathogenic fungus, <i>Isaria fumosorosea</i> @ 5 ml/l
T ₄	Forceful water spray @ 10 l/plant
T ₅	Combination of T ₁ +T ₂ +T ₃
T ₆	Control

First spray application was done in the month of March and second spray was done at 20 days after first application. The method of application includes spraying with *Isaria fumosorosea* @ 5 ml/litre, neem oil 10,000 ppm @ 1 ml per litre along with 10 g detergent and water jet spray with the pedal sprayer using 10 litre of water per palm. These were sprayed thoroughly to cover the infested leaves. Observations on extent of leaf damage by rugose spiralling whitefly were taken at one day before and 3, 7 and 15 days after treatment for each spray. The total number of affected leaves by spirals and adults were recorded separately and percentage damage was calculated.

The data pertaining to eco-friendly management of RSW were square root transformed, analysed statistically to arrive at meaningful conclusion. F test was conducted to test the significance of variations in the treatments. The standard error mean [(SE(m) ±) and critical difference (CD) @ 5% level of significance were also calculated by following the procedure given by Gomez and Gomez (1984) [3].

Results and Discussion

The results on efficacy of various eco-friendly management practices after imposition of first and second round treatment on RSW spirals per leaflet in coconut were presented in Table 2 and 3. A non-significant result of pest incidence was found among different treatments one day before application of first round of treatment. Observation record at 3, 7 and 15 days after treatment (DAT) showed a significant variation over the treatments. Most promising management practice against RSW was found to be combination treatment (yellow sticky traps + Azadirachtin 10,000 ppm + *Isaria fumosorosea*) during the first round of treatment. A similar trend of results was obtained in RSW at 3, 7 and 15 DAT in second round of treatment registering minimum leaf damage by RSW population in combination treatment (yellow sticky traps + Azadirachtin 10,000 ppm @ 1ml/l along with 10 g detergent + *Isaria fumosorosea* @ 5 ml/l). In first round of treatment the mean spirals per leaflet was found to be 13.55 and damage intensity per leaflet was at medium level in combination treatment (T₅). High damage intensity per leaflet (24.65) was noticed in control.

In second round of treatment the damage intensity per leaflet was reduced to low level in T₅ (9.40), whereas high damage intensity was witnessed in T₁ (22.95) and control (23.29).

Maximum reduction of spirals per leaflet over control (45.04%) was noticed in combination treatment (yellow sticky traps, + Azadirachtin 10,000 ppm + *Isaria fumosorosea*), whereas least reduction of RSW spirals per leaflet was registered in T₁ (10.35%) after first round of treatment. Similar trend was observed after second round of treatment. Least mean adult population of RSW per leaflet was noticed in combination treatment (44.65) while, highest mean adult population per leaflet was observed in control (69.78) after first round of treatment. Similar trend was witnessed after second round of treatment with a decrease of adult population in T₅ (33.51).

In the first round of treatment maximum reduction of RSW adults (36.01%) was registered in combination treatment (yellow sticky traps+ Azadirachtin 10,000 ppm + *Isaria fumosorosea*) over control, whereas least reduction (21.73%) of RSW adults per leaflet was noticed in yellow sticky traps. After second round of treatment similar trend was observed with an increase in reduction of adult population (53.83%).

The current results of first and second round of treatment revealed that the mean reduction and percent reduction of spirals and adults over control were found low in combination treatment T₅. Current results are in accordance with the findings of Krishnarao *et al.* (2019) [4], who observed combination treatment (yellow sticky traps + water spray + Azadirachtin 10,000 ppm @ 1 ml/l along with 10 g detergent powder @ 10 g/l) was found to be effective as low intensity and low whitefly adults (9.43 ± 2.18) was recorded. Elango and Nelson (2020) [11] noticed that the mortality of nymphs and adults by Neemazal F at 0.05% was 66.67%. The present findings derive ample support from the observations of Sumalatha *et al.* (2020) [8], who reported that the fungus, *Isaria fumosorosea* showed high pathogenicity (80.65%) on fourth instar nymphs leading to drastic reduction of adult emergence.

Table 2 Effect of various eco-friendly management practices on incidence of RSW spirals/leaflet on coconut after first round of spraying

Treatments	Treatment details	1 DBT	3 DAT	7 DAT	15 DAT	Mean	Reduction (%) over control
T ₁	Efficiency of yellow sticky traps	21.05 (4.69)	20.95 (4.68)	22.65 (4.86)	22.70 (4.87)	22.10	10.35
T ₂	Spraying of Azadirachtin 10,000 ppm @ 1 ml along with detergent powder @ 10 g	20.95 (4.68)	17.02 (4.24)	15.09 (4.01)	14.58 (3.95)	15.56	36.86
T ₃	Spraying of entomopathogenic fungus <i>Isaria fumosorosea</i>	20.96 (4.69)	18.83 (4.45)	12.44 (3.66)	10.83 (3.44)	14.03	43.07
T ₄	Forceful water spray	22.65 (4.86)	11.54 (3.54)	19.00 (4.47)	19.68 (4.55)	16.74	32.10
T ₅	Combination of all treatments (T ₁ +T ₂ +T ₃) = T ₅	20.53 (4.64)	15.54 (4.07)	11.85 (3.58)	13.25 (3.77)	13.55	45.04
T ₆	Control	22.87 (4.88)	24.77 (5.08)	24.42 (5.04)	24.77 (5.08)	24.65	-
SE (m) ±		0.046	0.037	0.060	0.045	-	-
CD (P = 0.05)		NS	0.11	0.18	0.14	-	-

Figures in parentheses are square root transformed values $\sqrt{(x+1)}$.

Table 3: Effect of various eco-friendly management practices on incidence of RSW spirals/leaflet on coconut after second round of spraying

Treatments	Treatment details	1 DBT	3 DAT	7 DAT	15 DAT	Mean	Reduction (%) over control
T ₁	Efficiency of yellow sticky traps	21.27 (4.82)	22.18 (4.81)	20.68 (4.65)	22.99 (4.90)	22.95	5.76
T ₂	Spraying of Azadirachtin 10,000 ppm @ 1 ml along with detergent powder @ 10 g	15.94 (4.12)	12.95 (3.73)	12.58 (3.68)	9.58 (3.25)	11.70	49.76
T ₃	Spraying of entomopathogenic fungus <i>Isaria fumosorosea</i>	15.23 (4.03)	14.15 (3.89)	8.88 (3.40)	8.73 (3.12)	9.92	57.41
T ₄	Forceful water spray	22.65 (4.86)	10.83 (3.44)	16.94 (4.24)	22.93 (4.89)	16.90	27.44
T ₅	Combination of all treatments (T ₁ +T ₂ +T ₃) = T ₅	16.94 (4.24)	13.38 (3.79)	8.46 (3.11)	8.36 (3.06)	9.40	59.63
T ₆	Control	21.84 (4.78)	22.43 (4.84)	23.21 (4.92)	24.24 (5.02)	23.29	-
SE (m) ±		0.036	0.049	0.032	0.025	-	-
CD (P = 0.05)		0.11	0.15	0.10	0.08	-	-

Figures in parentheses are square root transformed values $\sqrt{(x+1)}$.

Table 4: Effect of various eco-friendly management practices on incidence of RSW adults on coconut after first round spraying

Treatments	Treatment details	1 DBT	3 DAT	7 DAT	15 DAT	Mean	Reduction (%) over control
T ₁	Efficiency of yellow sticky traps	63.76 (8.05)	57.46 (7.65)	53.95 (7.41)	52.43 (7.31)	54.61	21.73
T ₂	Spraying of Azadirachtin 10,000 ppm @ 1 ml along with detergent powder @ 10 g	63.93 (8.06)	50.00 (7.14)	45.20 (6.80)	43.40 (6.66)	45.80	34.37
T ₃	Spraying of entomopathogenic fungus <i>Isaria fumosorosea</i>	62.96 (8.00)	56.18 (7.56)	43.55 (6.67)	36.44 (6.12)	45.39	34.95
T ₄	Forceful water spray	65.01 (8.12)	52.80 (7.33)	52.93 (7.34)	52.31 (7.30)	52.68	24.50
T ₅	Combination of all treatments (T ₁ +T ₂ +T ₃) = T ₅	64.99 (8.12)	47.50 (6.96)	44.66 (6.76)	41.78 (6.54)	44.65	36.01
T ₆	Control	66.06 (8.19)	69.43 (8.39)	69.95 (8.42)	69.94 (8.42)	69.78	-
SE (m) ±		1.447	0.016	0.031	0.030	-	-
C.D (P = 0.05)		NS	0.05	0.09	0.09	-	-

Figures in parenthesis are square root transformed values $\sqrt{(x+1)}$.

Table 5: Effect of various eco-friendly management practices on incidence of RSW adults on coconut after second round spraying

Treatments	Treatment details	1 DBT	3 DAT	7 DAT	15 DAT	Mean	Reduction (%) over control
T ₁	Efficiency of yellow sticky traps	55.31 (7.50)	52.40 (7.31)	50.09 (7.15)	49.79 (7.13)	50.76	30.07
T ₂	Spraying of Azadirachtin 10,000 ppm @ 1 ml along with detergent powder @ 10 g	46.53 (6.89)	37.61 (6.21)	37.48 (6.20)	32.53 (5.79)	35.87	50.58
T ₃	Spraying of entomopathogenic fungus <i>Isaria fumosorosea</i>	43.28 (6.65)	39.55 (6.37)	36.81 (6.15)	30.93 (5.65)	35.76	50.73
T ₄	Forceful water spray	55.65 (7.53)	42.63 (6.60)	40.09 (6.41)	43.65 (6.23)	41.36	43.02
T ₅	Combination of all treatments (T ₁ +T ₂ +T ₃) = T ₅	44.98 (6.78)	36.29 (6.11)	34.05 (5.92)	30.19 (5.58)	33.51	53.83
T ₆	Control	71.25 (8.50)	72.15 (8.55)	72.97 (8.60)	72.63 (8.58)	72.58	-
SE (m) ±		0.025	0.037	0.034	0.031	-	-
C.D (P = 0.05))		0.08	0.11	0.10	0.10	-	-

Figures in parentheses are square root transformed values $\sqrt{(x+1)}$.

Conclusion

Among the various eco-friendly management practices tested against RSW infestation the combination treatment (yellow sticky trap + neem oil 10,000 ppm + *Isaria fumosorosea*) was significantly differed from rest other treatments and found to be best, which was followed by spraying with *Isaria fumosorosea*. Based on the efficacy of various management practices followed the descending order of RSW management is $T_5 > T_3 > T_2 > T_4 > T_1$. The combination of yellow sticky trap + neem oil 10,000 ppm + *Isaria fumosorosea* was found effective in managing the RSW spiral population with 45.04 and 59.63 percent reduction over control after first and second round of treatment, respectively. Same treatment is also responsible in bringing down the adult population after first and second round of treatment.

Acknowledgement

The authors acknowledge All India Coordinated Research Project on Palms under Odisha University of Agriculture and Technology, Bhubaneswar, Odisha for their support and co-operation.

Conflicts Of Interest

Authors declared that there is no conflict of interest exist.

References

1. Elango K, Nelson SJ. Effect of host plants on the behaviour of rugose spiralling whitefly *Aleurodicus rugioperculatus* Martin and their natural enemies. Res J Agric Sci. 2020;11(1):120-123.
2. Elango K, Nelson SJ, Sridharan S, Paranidharan V, Balakrishnan S. Biology, distribution and host range of new invasive pest of India, coconut rugose spiralling whitefly *Aleurodicus rugioperculatus* Martin, in Tamil Nadu and the status of its natural enemies. Int J Agric Sci. 2019;11(9):8423-8426.
3. Gomez KA, Gomez AA. Statistical procedures for agricultural research. 2nd ed. New York: John Wiley & Sons; 1984. p. 1-680.
4. Krishnarao G, Chalapathirao NBV. Surveillance and eco-friendly management of new invasive alien pest, rugose spiralling whitefly *Aleurodicus rugioperculatus* Martin: inherent menace. J Appl Zool Res. 2019;30(2):148-158.
5. Kumar N, Kapoor S. Agricultural economics research review. In: Proceedings of the Conference held in Gujarat; 2010. Agric Econ Res Rev. 2010;23:411-418.
6. Raghavi MD, Sakthi BM, Surender S, Lokesh P, Kalidas K. Review on area, production and productivity of coconut in India. Int J Res Bus Manag. 2019;7(1):1-6.
7. Selvaraj K, Ankita G, Venkatesan T, Jalali SK, Sundararaj R, Chandish RB. First record of invasive rugose spiralling whitefly *Aleurodicus rugioperculatus* Martin (Hemiptera: Aleyrodidae) along with parasitoids. Karnataka J Biol Control. 2017;31(2):74-78.
8. Sumalatha BV, Selvaraj K, Poornesha B, Ramanujam B. Pathogenicity of entomopathogenic fungus *Isaria fumosorosea* on rugose spiralling whitefly *Aleurodicus rugioperculatus* and its effect on parasitoid *Encarsia guadeloupae*. Biocontrol Sci Technol. 2020;30(10):1150-1161.
9. Sushmitha S, Sujatha A, Emmanuel N, Uma KK, Suneetha DRS. Incidence, intensity and host dynamics of rugose spiralling whitefly *Aleurodicus rugioperculatus* Martin (Hemiptera: Aleyrodidae) in Andhra Pradesh. Pest Manag Hortic Ecosyst. 2020;26(1):109-120.