https://doi.org/10.33307/entomon/v48i4/996
ENTOMON 48(4): 595-598
Short Communication No. ent. 48414

Efficacy of insecticides against cashew leaf miner, *Acrocercops syngramma* Meyrick (Lepidoptera, Gracillariidae)

O. Chethana*, Jayalaxmi Narayan Hegde, K. Rajashekharappa, T. Basavaraj Naik[1] and B.V. Champa[2]

Department of Entomology, College of Agriculture, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences (KSNUAHS), Navile, Shivamogga 577204, Karnataka, India.
[1]Zonal Agricultural and Horticultural Research Station (ZAHRS), KSNUAHS, Navile, Shivamogga 577204, Karnataka, India.
[2]Organic Farming Research Centre, ZAHRS, KSNUAHS, Navile, Shivamogga 577204, Karnataka, India.
Email: chetan1091998@gmail.com

ABSTRACT: Experiments were conducted to know the efficacy of different insecticides (Cyantraniliprole 10.26 % OD @ 1.8 ml L^{-1}, Dinotefuran 20 % SG @ 0.3 g L^{-1}, Chlorfenapyr 10 % SC @ 1.5 ml L^{-1}, Imidacloprid 17.8 % SL @ 0.3 ml L^{-1}, Thiamethoxam 25 % WG @ 0.3 g L^{-1}, Lambda cyhalothrin 2.5 % EC @1 ml L^{-1}) against cashew leaf miner, *Acrocercops syngramma* Meyrick under field condition and under nursery condition Among the different insecticides evaluated, under field condition, Lambda cyhalothrin was found to be statistically superior over all other treatments recording 83.39 per cent reduction over control. Imidacloprid was found least effective against leaf miner (46.41% reduction of over control). Under nursery condition, Lambda cyhalothrin recorded 79.13 per cent reduction whereas Imidacloprid recorded only 20.31 per cent. © 2023 Association for Advancement of Entomology

KEY WORDS: Field, nursery, lambda cyhalothrin, imidacloprid, leaf miner control

Leaf miner, *Acrocercops syngramma* Meyrick (Lepidoptera, Gracillariidae) is one of the important pests of cashew during the post-monsoon period all over the country. The larvae, after hatching from the eggs, start mining the epidermal layer on the upper surface of the tender cashew leaves as well as tender shoots. As a result of feeding, the affected area forms blistered patches of grayish white colour. When the infested leaves mature, the damage manifests as big holes. Young plants are observed to be more prone to attack by this pest and up to 8 and 15 caterpillars have been observed on a single leaf. During the developmental period, leaf miner larvae are dull white and turn pinkish before pupation. After full development, the larvae fall off to the soil where they pupate and emerge after 7-9 days. The adult is a silvery grey moth that lays eggs on tender leaves (Athalye and Patil, 1999). Leaf miner is a defoliating pest of cashew, occurring in almost all the cashew-growing regions of the country as well as the world. In India, it causes serious damage to the tender leaves of cashew

* Author for correspondence

attacking 2-80 per cent of the young leaves (Ayyanna *et al*., 1985). Upon hatching, the larva makes a silvery sinuous gallery on the upper leaf side feeding below the epidermal layer, causing leaf blisters which later dry up, causing leaf distortion, browning and curling of the leaves. As many as 11 larvae have been observed feeding on a single leaf (Jena *et al*., 1985). The pest completes its life cycle in a short period of 20-22 days and spreads fast causing leaf blisters over a wide area (Rai, 1984). Over the decades, use of chemical insecticides has become the only line of defense to combat the major pests of cashew (Kar, 2017). Lambda cyhalothrin is a proven insecticide against tea mosquito bug and other associated pests. However, the recent advances in pest management are being directed towards the development of safer and effective insecticides which reduce the pesticide load in the environment.

Efficacy of insecticides under field conditions: The experiment was conducted in field conditions at Zonal Agricultural and Horticultural Research Station (ZAHRS), Shivamogga, Karnataka in randomized complete block design (RCBD) with six insecticidal treatments (Cyantraniliprole 10.26 % OD @ 1.8ml L^{-1}, Dinotefuran 20 % SG @ 0.3 g L^{-1}, Chlorfenapyr 10 % SC @ 1.5ml L^{-1}, Imidacloprid 17.8 % SL @ 0.3ml L^{-1}, Thiamethoxam 25 % WG @ 0.3g L^{-1}, Lambda cyhalothrin 2.5 % EC @1ml L^{-1}) and a control, with three replications (one tree is one replication to evaluate insecticides for the management of cashew leaf miner. In each tree, 20 young leaves were randomly selected representing four directions, and in each directions five leaves three from from top and two from middle canopy were selected. Number of leaf miner larvae per leaf were counted and averaged. Pre-treatment count a day before spraying and post treatment counts on three, five, seven and ten days after spraying were recorded. Two sprays were given during the peak incidence in December month. The data were subjected to statistical analysis.

Efficacy of insecticides at Nursery: The experiment was conducted in nursery of one and half year age plants at Agricultural and Horticultural Research Station (AHRS), Bavikere, Chikkamagaluru, Karnataka with RCBD with seven treatments including control (as above) with three replications to evaluate insecticides for the management of cashew leaf miner. In each replication, there were ten plants. One spray was given during the peak incidence during November month. Five plants were selected randomly from each replication in each treatment. In each plant, two top leaves were selected randomly. Number of leaf miner larvae were counted and averaged. Pre-treatment count a day before spraying and post treatment counts on three, five, seven and ten days after spraying were recorded.

The statistical analysis of the data obtained from insecticidal efficacy trial was done using analysis of variance (ANOVA) using Web Agri Stat Package (WASP-2) developed by Indian Council of Agricultural Research, Research Complex, Goa. The numerical data were subjected to a square root transformation before subjecting to ANOVA. After analysis, data were fitted in the table as per the needs of objectives for interpretation of results and the data were correlated with the weather parameters following the methods of Gomez and Gomez (1984). The interpretation of data was done by using the critical difference value calculated at 0.05 probability level. Further, the per cent reduction of cashew leaf miner over control was calculated by following formula:

$$\text{Per cent reduction} = \frac{C_b - T_a}{C_b} \times 100$$

Where, C_b = number of insects in untreated control before insecticide application

Ta = number of insects in treated plot after insecticide application

Results of field trial revealed that the incidence of leaf miner (larvae per 20 leaves) ranged from 1.90 to 11.44 in all the treatments including control. The least larval population (1.90 larvae) was recorded in Lambda cyhalothrin treatment, followed by Cyantraliprole (3.48 larvae), Dinotefuran 20 (4.01 larvae), Thiamethoxam (4.65 larvae) and Chlorfenapyr (5.00 larvae). Among the insecticides treated trees, highest mean larval population was

Table 1. Efficacy of insecticides under field condition against Leaf miner, *A. syngramma* on cashew at ZAHRS, Shivamogga during 2021 - 22

No.	Treatments	Dose per lt	Mean number of leaf miner larvae/20 leaves										Reduction (%)
			First Spray					Second Spray					
			1	3	5	7	10	3	5	7	10	Mean	
1	Cyantraliprole 10.26 OD	1.8ml	12.80 (3.64)	6.89 (2.71)^{c}	5.91 (2.52)^{cd}	4.55 (2.22)^{c}	3.11 (1.88)^{cd}	3.01 (1.87)^{d}	1.90 (1.54)^{c}	1.17 (1.29)^{de}	1.30 (1.33)^{c}	3.48	69.58
2	Dinotefuran 20 SG	0.3g	12.53 (3.61)	6.96 (2.72)^{c}	6.50 (2.62)^{bcd}	7.31 (2.77)^{b}	3.51 (1.97)^{c}	3.21 (1.92)^{cd}	2.41 (1.69)^{c}	1.73 (1.49)^{cd}	0.45 (0.97)^{e}	4.01	64.94
3	Chlorfenapyr 10 SC	1ml	13.27 (3.71)	8.79 (3.05)^{bc}	8.35 (2.97)^{bc}	7.48 (2.81)^{b}	4.45 (2.21)^{bc}	4.10 (2.14)^{cd}	3.23 (1.91)^{bc}	2.47 (1.71)^{bc}	1.12 (1.27)^{cd}	5.00	56.29
4	Imidacloprid 17.8 SL	0.3ml	12.80 (3.65)	9.33 (3.12)^{b}	9.41 (3.14)^{ab}	8.53 (2.99)^{b}	6.32 (2.61)^{b}	5.91 (2.52)^{b}	4.16 (2.16)^{b}	3.56 (1.99)^{b}	1.80 (1.51)^{b}	6.13	46.41
5	Thiamethoxam 25 WG	0.3g	12.93 (3.66)	8.57 (3.01)^{bc}	7.23 (2.73)^{bc}	7.22 (2.77)^{b}	4.63 (2.24)^{bc}	4.23 (2.71)^{c}	2.45 (1.71)^{c}	1.99 (1.58)^{cd}	0.85 (1.16)^{d}	4.65	59.35
6	Lambda cyhalothrin 2.5 EC	1ml	12.67 (3.62)	4.90 (2.30)^{d}	4.12 (2.14)^{d}	2.52 (1.71)^{d}	1.32 (1.35)^{d}	1.14 (1.23)^{e}	0.72 (1.10)^{d}	0.35 (0.92)^{e}	0.10 (0.77)^{f}	1.90	83.39
7	Control	-	14.00 (3.81)	13.25 (3.70)^{a}	12.85 (3.65)^{a}	12.53 (3.60)^{a}	10.80 (3.36)^{a}	10.91 (3.37)^{a}	10.75 (3.35)^{a}	10.54 (3.32)^{a}	9.89 (3.22)^{a}	11.44	
SEm ±			-	0.122	0.179	0.143	0.188	0.096	0.126	0.128	0.054		
CD at 0.05			NS	0.366	0.539	0.431	0.566	0.290	0.380	0.385	0.162		
CV (%)			5.918	6.979	10.727	8.983	14.245	7.499	11.116	12.330	6.213		

Note: DBS - Days Before Spray, DAS - Days After Spray, Figures in parenthesis are $\sqrt{x+0.5}$ transformed values;
Means in the columns followed by the same alphabet do not differ significantly by DMRT (P = 0.05).

recorded in Imidacloprid (6.13) sprayed trees. In untreated control, there were 11.44 larvae per 20 leaves. Leaf miner reduction of over control was maximum in Lambda cyhalothrin (83.39%), followed by Cyantraliprole (69.58%) and Dinotefuran (64.94%), Thiamethoxam (59.35%) and Chlorfenapyr (56.29%). The least was recorded in Imidacloprid (46.41%) among the insecticides (Table 1).

In the nursery experiment, the incidence ranged from 1.88 to 9.01 larvae per 10 leaves. Among the insecticides, the least mean number was recorded in Lambda cyhalothrin treatment (1.88 larvae per 10 leaves), followed by Cyantraliprole (3.11), Dinotefuran (4.55), Thiamethoxam (4.77) and Chlorfenapyr (5.39). The maximum mean number was recorded in Imidacloprid (7.18). In untreated control it was 9.01. The reduction leaf miner larvae over the control, was highest in Lambda cyhalothrin (79.13%), followed by Cyantraliprole (65.48%), Dinotefuran (49.50 %), Thiamethoxam (47.05%) and Chlorfenapyr (40.17%). The least was recorded in Imidacloprid (20.31%) among the insecticides (Table 2). Overall, among the insecticides evaluated, Lambda cyhalothrin 2.5 EC @ 1 ml L^{-1} was found most effective in managing the leaf miner, *A. syngramma* in cashew with respect mean number of larvae and percent reduction over the control both in field and nursery conditions.

These results are in line with Kar (2017) and Patel *et al*. (2018) who reported that out of different insecticides evaluated against leaf miner of cashew, Lambda cyhalothrin 5 EC (@ 0.003%) was most efficient which recorded minimum leaf damage in

Table 2. Efficacy of insecticides against Leaf miner, *Acrocercops syngramma* in cashew nursery at AHRS, Bavikere during 2021

No.	Treatments	Dosage per L	Mean no. of leaf miner larvae/10 leaves						Reduction over control %
			1DBS	3DAS	5DAS	7DAS	10DAS	Mean	
1	Cyantraliprole 10.26 OD	1.8ml	6.99 (2.68)	5.34 (2.38)^{bc}	3.21 (1.91)^{de}	2.61 (1.75)^{cd}	1.28 (1.33)^{d}	3.11	65.48
2	Dinotefuran 20 SG	0.3g	9.12 (3.10)	8.59 (3.01)^{a}	3.88 (2.07)^{cde}	3.22 (1.92)^{c}	2.52 (1.74)^{c}	4.55	49.50
3	Chlorfenapyr 10 SC	1ml	8.09 (2.92)	7.59 (2.83)^{ab}	5.93 (2.53)^{bc}	4.16 (2.16)^{bc}	3.88 (2.06)^{bc}	5.39	40.17
4	Imidacloprid 17.8 SL	0.3ml	7.59 (2.83)	8.93 (3.06)^{a}	8.59 (3.01)^{ab}	6.29 (2.56)^{ab}	4.90 (2.32)^{b}	7.18	20.31
5	Thiamethoxam 25 WG	0.3g	7.64 (2.85)	6.49(2.58)^{abc}	5.32 (2.40)^{cd}	4.23 (2.17)^{bc}	3.05 (1.87)^{c}	4.77	47.05
6	Lambda cyhalot hrin 2.5 EC	1ml	6.93 (2.72)	4.22 (2.16)^{c}	1.87 (1.53)^{e}	1.10 (1.26)^{d}	0.33 (0.91)^{e}	1.88	79.13
7	Control	-	8.01 (2.90)	9.18 (3.10)^{a}	9.22 (3.12)^{a}	9.08 (3.09)^{a}	8.55 (3.00)^{a}	9.01	
		SEm ±	-	0.193	0.185	0.179	0.128		
		CD at 0.05	NS	0.580	0.556	0.538	0.386		
		CV (%)	11.68	11.928	13.216	14.198	11.486		

Note: DBS - Days Before Spray; DAS - Days After Spray; Figures in parenthesis are $\sqrt{x+0.5}$ transformed values;
Means in the columns followed by the same alphabet do not differ significantly by DMRT (P = 0.05).

the field. In nursery also, the experiment results are in line with Kar (2017) and Patel *et al*. (2018) who reported that Lambda cyhalothrin 5 EC (@ 0.003%) was effective in minimizing the leaf damage. Overall, among the insecticides evaluated both in field and nursery conditions, Lambda cyhalothrin 2.5 EC @ 1ml L^{-1} was found most effective in managing the leaf miner, *A. syngramma* in cashew with respect mean number of larvae and percent reduction over the control.

REFERENCES

Athalye S.S. and Patil R.S. (1999) Bionomics, seasonal incidence and chemical control of cashew leaf miner. Journal of Maharashtra Agricultural Universities 23: 29–23.

Ayyanna T., Tejkumar S. and Ramadevi (1985) Distribution and status of pests of cashew in coastal districts of Andhra Pradesh. Cashew Causerie 7: 4–5.

Gomez K.A. and Gomez A.A. (1984) Statistical procedures for agricultural research, 2nd addition. An International Rice Research Institute Book, A Wiley - Inter science Publication, New York. pp20–29, 382–387.

Jena B.C., Patnaik N.C. and Satapathy C.R. (1985) Insect pests of cashew. Cashew Causerie 7(3): 10–11.

Rai P. (1984) Seasonal distribution of cashew in coastal Karnataka. Indian Cashew Journal 13(4): 17–19.

Kar A. (2017) Evaluation of few insecticides against insect pests of cashew. Journal of Entomology and Zoology Studies 5(2): 1345–1347.

Patel R.B., Patel D.R., Makati J.P. and Patel R R. (2018) Evaluation of insecticides against pest complex of cashew. International Journal of Economic Plants 5(1): 36–39.

(Received August 03, 2023; revised ms accepted October 10, 2023; published December 31, 2023)