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Research Article

Bio-efficacy of Insecticides and Botanical against Tea Mosquito Bug, *Helopeltis antonii* Signoret Infesting Cashew

Damasia D. M.[1*] and Patel Z. P.[2]

[1]Ph.D. Scholar and Assistant Professor,

[2]Dean and Principal,

College of Agriculture, Navsari Agricultural University,

Waghai-394730, Dist- The Dangs, Gujarat, India

*Corresponding Author E-mail: dmdamasia@nau.in

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ABSTRACT

Field trail was conducted on farmer's field at two different locations in the Dangs during 2017-18 to evaluate the bio- efficacy of six different treatment comprised of insecticide molecules and azadirachtin 10000 ppm against tea mosquito bug in cashew. The results revealed that, among the different treatment tested significantly highest 62.60 per cent mortality of tea mosquito bug was observed in treatment T6 (buprofezin, azadirachtin, buprofezin). The next effective treatments were T4 (diafenthiuron, azadirachtin, diafenthiuron) and T5 (pymetrozine, azadirachtin, pymetrozine) which remained at par and proved equally effective as they registered 54.24 and 52.69 per cent mortality of tea mosquito bug. The highest nut yield (1027 kg/ha) and cost benefit ratio (1:7.13) was recorded in treatment T6 (buprofezin, azadirachtin, buprofezin).

Keywords: *Cashew, Tea mosquito bug, Mortality, Buprofezin, Azadirachtin*

INTRODUCTION

Cashew (*Anacardium occidentale* L.) belongs to family Anacardiaceae. The nuts, apple and other by-products of this crop are of commercial importance. In Gujarat the cashew is grown in the area of the Dangs, Valsad and Dahod districts. The production and productivity of cashew is influenced by many factors, among these insect pest is one of the major. Rai (1984) listed 133 species of insects on cashew. Sixty species causing regular damage has been documented by Pillai et al. (1976). Among these, the tea mosquito bug, *Helopeltis antonii* Signoret alone has a potential to cause 40 to 50 per cent yield loss in cashew (Anonymous, 1999).

Chemical management of tea mosquito bug is the most easy and economical method. Hence, keeping the above points in view, the experiment was conducted on Farmers field in the Dangs.

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MATERIALS AND METHODS

A field experiment for evaluation of effective treatment for management of tea mosquito bug of cashew was conducted on farmer's field at two different locations in the Dangs during 2017-18. There were seven different treatments statistically fitted in Randomized Block Design with four replications. The treatment details are as fallow.

T1	First spray of spiromesifen 22.9 SC at 0.012% at flushing stage, second spray of azadirachtin 10000 ppm at 0.002% at flowering stage and third spray of spiromesifen 22.9 SC at 0.012% at pea nut stage.
T2	First spray of flonicamid 50 WG at 0.015% at flushing, second spray of azadirachtin 10000 ppm at 0.002% at flowering stage and third spray of flonicamid 50 WG at 0.015% at pea nut stage.
T3	First spray of pyriproxyfen 10 EC at 0.01% at flushing, second spray of azadirachtin 10000 ppm at 0.002% at flowering stage and third spray of pyriproxyfen 10 EC at 0.01% at pea nut stage.
T4	First spray of diafenthiuron 50 WP at 0.05% at flushing, second spray of azadirachtin 10000 ppm at 0.002% at flowering stage and third spray of diafenthiuron 50 WP at 0.05% at pea nut stage.
T5	First spray of pymetrozine 50 WG at 0.02% at flushing, second spray of azadirachtin 10000 ppm at 0.002% at flowering stage and third spray of pymetrozine 50 WG at 0.02% at pea nut stage.
T6	First spray of buprofezin 25 SC at 0.05% at flushing, second spray of azadirachtin 10000 ppm at 0.002% at flowering stage and third spray of buprofezin 25 SC at 0.05% at pea nut stage.
T7	Control

All the insecticides were applied in the form of foliar spray with the help of gator rocking spryer. To evaluate the efficacy of different insecticide treatment, thirteen leader shoots in each direction *viz.*, East, West, North and South were selected from each treatment tree and tagged. Observations were taken by counting the number of tea mosquito bug nymphs and adults.

The observations were recorded at one day before the spray and seven, fourteen and twenty one day after each spraying of different insecticides.

The data on pest count were converted to per cent mortality by using the following formula given by Henderson and Tilton (1955) and then transformed into arcsine transformation before statistical analysis.

$$\text{Corrected per cent mortality} = 100 \times \left(1 - \frac{Ta \times Cb}{Tb \times Ca}\right)$$

Where,

Ta = Number of insect-pests recorded after treatment

T_b = Number of insect-pests recorded before treatment

C_a = Number of insect-pests recorded from check plot after treatment

C_b = Number of insect-pests recorded from check plot before treatment

With a view to ascertain the effect of different insecticides on the yield, harvested cashew nuts were weighed separately from each treatment tree and yield was converted on hectare basis.

In order to know the economics of different treatments evaluated against tea mosquito bug of cashew, Cost Benefit Ratio of each insecticide used were worked out for each treatment.

RESULTS AND DISCUSSION

The data obtained on mortality of tea mosquito bug in various treatments of location I are presented in Table 1 revealed significant difference among the treatments. Significantly highest tea mosquito bug mortality was found in the treatment T6 (61.20 per cent mortality).

The next effective treatments were of T4 (54.04 per cent mortality) and T5 (52.82 per cent mortality) which remained at par with each other. The remaining treatment of T2, T3 and T1 found least effective against tea mosquito bug as they registerd less than 50 per cent mortality.

Table 1: Bio efficacy of various insecticides against tea mosquito bug in cashew

Treatment	Mean per cent mortality of tea mosquito bug after three spray			Mean Yield (kg/ha)	Cost Benefit Ratio
	Location I	Location II	Pooled over location and spray		
T1	36.83 (35.94)	35.63 (33.94)	36.23 (34.93)	502	1: 1.18
T2	42.59 (45.81)	42.35 (45.38)	42.47 (45.59)	610	1: 1.89
T3	39.42 (40.33)	41.64 (44.15)	40.53 (42.24)	530	1: 1.80
T4	47.32 (54.04)	47.55 (54.45)	47.43 (54.24)	849	1: 2.97
T5	46.62 (52.82)	46.47 (52.56)	46.54 (52.69)	811	1: 3.30
T6	51.47 (61.20)	53.12 (63.99)	52.30 (62.60)	1027	1: 7.13
T7	-	-	-	351	-
S.Em.± (T)	1.51	1.70	1.05	29.55	-
CD at 5% (T)	4.37	4.92	2.96	84.83	-
S.Em.± (P X T)	2.62	2.95	1.82	-	-
CD at 5% (P X T)	NS	NS	NS	-	-
S.Em.± (P X S X L)	-	-	2.96	41.79	-
CD at 5% (P X S X L)	-	-	NS	NS	-
CV %	10.31	11.51	10.08	12.50	-

*Arcsine transformed value **Figures in the parentheses are retransformed values

Similar trend of effectiveness also obtained in location II. Significantly highest tea mosquito bug mortality was found in the T6 (63.99 per cent). The next effective treatments were of T4 (54.45 per cent mortality) and T5 (52.56 per cent mortality) which remained at par with each other. Later was also at par with T2 (45.38 per cent mortality) and T3 (44.15 per cent mortality). The treatment of T1 (33.94 per cent mortality) found least effective against tea mosquito bug.

It is evident from pooled data of two locations revealed significant difference among the treatments. The significantly highest 62.60 per cent mortality of tea mosquito bug was observed in treatment T6 (buprofezin, azadirachtin, buprofezin). The next effective treatments were T4 (diafenthiuron, azadirachtin, diafenthiuron) and T5 (pymetrozine, azadirachtin, pymetrozine) which remained at par and proved equally effective as they registered 54.24 and 52.69 per cent mortality of tea mosquito bug. These were followed by T2 (flonicamid, azadirachtin , flonicamid) and T3 (pyriproxyfen, azadirachtin, pyriproxyfen) which were at par and gave less than 50 per cent mortality (45.59 and 42.24 per cent) of the pest. Treatment of T1 (spiromesifen, azadirachtin, spiromesifen) found significantly least effective in controlling tea mosquito bug (34.93 per cent mortality). The interaction between the periods, sprays and locations calculated was found non-significant indicating consistent performance of various chemical insecticides as well as botanicals against tea mosquito bug under field condition in hilly area of the Dangs.

In previous findings, Somnath et al. (2009) found azadirachtin 10,000 ppm as effective against tea mosquito bug. Similarly, Manimaran et al. (2019) also reported higher efficacy of azadirachtin 10,000 ppm over other bio-pesticides which is matched with the present investigation. Besides these, Hegde and Nidagundi (2009) reported that, buprofezin 25 SC at 1ml/l recorded lowest plant hopper population in rice at 10 days after spray. Bhanu (2015) reported effectiveness of buprofezin over pymetrozine and other insecticides against brown plant hopper and white backed plant hopper in rice. Zote et al. (2017) recorded superiority of buprofezin over lambda cyhalothrin and other insecticides. Bhatt et al. (2018) also recorded superiority of buprofezin against whitefly in okra over other insecticides. Sasikumar et al. (2018) also reported higher efficacy buprofezin against sucking pest in cotton over diafenthiuron and other insecticides which is matched with the present investigations.

Highest mean nut yield of 1027 kg/ha was recorded in treatment T6 (buprofezin, azadirachtin, buprofezin) (Table 1). Lower nut yield in plot may be due to high per cent damage by tea mosquito bug on flushing, panicle and nut and fruit developmental stages. These findings are in agreement with Hegde and Nidagundi (2009) as well as Bhanu (2015) in rice and Sasikumar et al. (2018) in cotton.

The data on the economics of different insecticidal treatments presented in Table 1 revealed that, treatment T6 found to have highest cost benefit ratio i.e. 1:7.13 followed by T5 (1:3.30), T4 (1:2.97), T2 (1: 1.89), T3 (1:1.80) and T1 (1:1.18).

Earlier, Hegde and Nidagundi (2009) obtained highest cost benefit ratio (1:3.38) in buprofezin 25 SC 1 ml/l. Sasikumar *et al.* (2018) reported highest cost benefit ratio (1:2.63) in the treatment of buprofezin 25 SC at 250 g a.i./ha which is matched with the present investigations.

CONCLUSION

The result indicated that, treatment comprised of first spray of buprofezin 0.05% at flushing, second spray of azadirachtin 0.002% at flowering and third spray of buprofezin 0.05% at pea nut stage found as most effective treatment and could achieve 62.60 per cent mortality of TMB. The highest cashew nut yield of 1027 kg/ha and cost benefit ratio 1:7.13 was obtained with the treatment of T6 (First spray of buprofezin 0.05%, Second spray of azadirachtin 0.002%, third spray of buprofezin 0.05%).

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