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Evaluation of few insecticides against insect pests of cashew

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Abstract
Efficacy of certain insecticides against cashew insect pests was tested in the experimental farm of the Regional Research Centre, BCKV, Jhargram during 2014-15 and 2015-16. Among the insecticides applied Lambda cyhalothrin @ 0.003% showed maximum efficacy to control leaf and blossom webber (9.57%) and leaf miner (8.4%) of cashew 30 days after first spray while acetamiprid @0.01% was also reported equally effective against the same insects and were statistically at par. Acetamiprid (0.01%) was recorded as most effective treatment to control apple and nut borer with 2.89% of damage which was closely followed by lambda cy-halothrin (2.97%) at 30 days after third spray. The trees treated with Neem oil soap @ 4% followed by Lambda Cyhalothrin @ 0.003% followed by again Neem oil soap was recorded superior to control thrips over the other treatments applied. However, imidacloprid @ 0.011% was recorded as least effective treatment to control cashew insects in the present study.

Keywords: Lambda cyhalothrin, acetamiprid, cashew insects, thrips

1. Introduction
Cashew (*Anacardium occidentale* L.) is an export oriented crop of India earning annual foreign exchange to the tune of Rs. 2515 crores/year for its delicious kernel. The area under cashew cultivation is around 10.11 lakh hectare, which is the highest among cashew growing countries in the world and the annual total production is approximately 7.53 lakh tones during 2013-14 [1]. Though India is having largest area under cashew cultivation but production as well as productivity is less compared to Vietnam and Nigeria. Production of cashew is greatly influenced by a number of biotic and abiotic factors like good quality planting materials, soil health, insect pests and diseases. Among these factors, insect pests are very important as they are capable to cause cent percent of yield loss. The crop is attacked by array of insects in different stages of its growth. However, depending on the climatic condition, biotic factors, geographical location and age of the plant, extent of pest damage varies. Considering the extent of damage inflicted and yield loss due to pest infestation, tea mosquito bug (*Helopeltis* sp.) and Cashew stem and root borer (*Plocaederus* sp.) are considered as primary pests of cashew as the insects are present all over the cashew growing swathe in world. Other than these two, leaf miner (*Acrocercops syngramma*), leaf and blossom webber (*Lambida moncusalis*), thrips (*Scirtothrips dorsalis*, *Azaleothrips* sp.), shoot tip caterpillar (*Hypatima haligramma*) and apple and nut borer (*Thylocoptila paurosema*) are also regarded as major insect pests [2]. All these foliage pests except CSRB are restricted at flushing, flowering and fruiting stage of the crop. Lots of work has been done on the primary insects of cashew but there is little information on the relative abundance, damage potential and management of cashew insect pests.

Over the decades the use of chemical insecticides has become the only line of defense to combat the major pests of cashew. It may be due to their inherent advantages like low cost of application, quick and long residual action of which use of chemical insecticides is still the most popular way out to the cashew growers. Cashew growers in West Bengal seldom use chemicals or insecticides to control insect pests and there is a very little knowledge regarding application of insecticides. Hence, with this background the present investigation was done to identify the promising insecticides against the insect pests of cashew.

2. Materials and Methods
2.1 Experimental site: The experiment was carried out in the experimental plot of cashew at the Regional Research Station, Bidhan Chandra Krishi Viswavidyalaya during 2014-15 and 2015-16 under AICRP on cashew.

2.2 Treatment details: The trees were planted during 2003 with variety BPP-8 keeping plant to plant distance of 6 x 6 m. The experiment was designed in Complete Randomized Block Design with six treatments and four replications. All the agronomic practices were followed as and when required. The insecticides applied as treatments were T1 - Neem oil soap (4%) - L-cyhalothrin-(0.003%) - neem oil soap (4%), T2- Imidacloprid @ 0.011% in all sprays, T3 - Acetamiprid @ 0.01% in all sprays, T4 - L-cyhalothrin @ 0.003% in all sprays, T5 - Profenophos @ 0.05% in all sprays and T6 – Untreated check where only water was used.

2.3 Methodology applied: Leaf miner damage was recorded from leaves of 5 randomly selected shoots from each sides (east, west, north and south) of canopy of each plant where number of healthy leaves and infested leaves were recorded and percent damage was calculated as per the procedure given by [3]. In case of Leaf and blossom webber (LBW), damage was recorded from 52 randomly selected shoots covering all sides of canopy of plant. The number of healthy shoot and webbed shoots were recorded and percent damage was calculated. Apple and nut borer (ANB) damage was recorded from 100 nuts and apples (only at the fruiting period) and percent damage was calculated. Thrips damage was recorded 50 nuts and apples (only at the fruiting period) and damage was scored using following 0-4 scale (0, no damage; 1, 1 to 25 percent surface damage; 2, 26 to 50 percent surface damage; 3, 51 to 75 percent surface damage; 4, 76 to 100 percent surface damage) and percent damage calculated following the procedure suggested by [4]

2.4 Data analysis: The recorded data were compiled and tabulated for statistical analysis. Analysis of variance (ANOVA) was done with the help of computer package SPSS and Least Significant Difference (LSD) when necessary.

3. Results and discussion

The pooled data of two years experimental result revealed that there was no significant difference of insecticides and untreated check before application of insecticides. All the insecticides were found superior to the untreated check after 30 days of application. Trees treated with Lambda cyhalothrin @ 0.003% of water was most efficient treatment with minimum leaf and blossom webber damage (9.57%) after 30 days of first spray (Table-1). It was statistically at par with treatment T3 - acetamiprid @ 0.01%, T5 - profenophos @ 0.05% and T1 - Neem oil soap (4%) - L-cyhalothrin-(0.003%) - neem oil soap 4% having damage percentage of 10.01, 10.62 and 11.28 respectively (Table-1). The leaf and blossom webber was completely disappeared after 30 days of second spray, even there was no infestation in untreated check. It may be due to the climatic factor or seasonal occurrence.

In order to merit of the insecticides, L-cyhalothrin was recorded significantly superior to all the other treatment in management of leaf miner damage (8.4%) after 30 days of first spray (Table-1). However, like leaf and blossom webber, L-cyhalothrin and acetamiprid both were found effective and statistically at par to control leaf miner. These two insecticides (acetamiprid and lambda cyhalothrin) were also recorded as the most effective treatment to control apple and nut borer damage with 2.89 and 2.97% respectively during the fruiting season at 30 days after second spray, these treatments were followed by T1(Neem oil soap (4%) - L-cyhalothrin-(0.003%) - neem oil soap (4%) with damage percentage of 7.86. The T2 treatment i.e. Imidacloprid (0.011%) all sprays was least effective to control maximum insects. The T1 treatment was found to be superior to minimize the thrips damage in nuts and apple with damage percentage of 23.40 and 22.81 followed by the treatment with acetamiprid (Table-1).

[5] reported that lambda cyhalothrin (0.003%) as more promising insecticide than carbaryl (0.1%) for the management of flower and fruit pests of cashew, which is in agreement with the present findings. Lambda cyhalothrin was reported effective against tomato leaf miner when applied @ 50 g ai/ha [6]. [7] has also reported that L- cyhalothrin was most effective treatment over diamethoate and malathion to control guava fruit fly and also with residue below MRL. Lambda cyhalothrin was recorded as the most effective treatment to control pomegranate fruit borer infestation level from 6.98 to 1.68 [8]. The efficacy of the insecticides like lambda cyhalothrin 0.003% and carbaryl 0.1% were already reported for use against TMB by [9]. As L-cyhalothrin is a photostable synthetic pyrethroid, it might have shown maximum residul action against maximum lepidopteran pests [10]. The residue analysis of lambda cyhalothrin (0.003%) showed that no residue was detected up to 0.01 ppm level [5, 11]. This is perhaps due to the fast degradation and sufficient time interval between application and harvest (around 30 days), as lambda cyhalothrin has been known to dissipate at faster rates under tropical conditions [12, 13] again reported that Lambda cyhalothrin was effectively control brinjal shoot and fruit borer as well less hazardous for the natural enemies when applied @300 ml/ha [14] has reported that acetamiprid 20 SP could effectively control citrus leaf miner when applied @ 0.04%. Considering the effectiveness of the tretmant T4 (L-cyhalothrin @ 0.003%) was superior to the others for managing insect pests of cashew. However acetamiprid was also found equally effective for controlling the insects.

Table 1: Efficacy of insecticides against cashew insect pests damage (%) (Pooled data of 2014-15 and 2015-16)

Treatment	LBW	LM	LBW	LM	LBW	LM	LBW	LM	ANB	Thrips	
	before spray		30 days after 1st spray							Nut	Apple
					30 days after 2nd spray		30 days after 2nd spray				
Neem oil soap (4%) – L-cyhalothrin-(0.003%) – neem oil soap (4%)	13.93 (21.78)	13.25 (21.32)	3.88 (11.28)	4.63 (12.37)	1.78 (7.61)	1.82 (7.60)	0.00 (0.00)	0.46 (3.79)	1.84 (7.68)	15.96 (23.40)	15.27 (22.81)
Imidacloprid (0.011%) in all sprays	12.98 (21.05)	14.33 (22.19)	4.92 (12.76)	5.66 (13.72)	2.03 (8.09)	2.16 (8.27)	0.00 (0.00)	0.32 (3.16)	13.66 (21.61)	24.68 (29.46)	22.75 (28.25)
Acetamiprid (0.01%) all sprays	15.33 (22.98)	15.11 (22.84)	3.05 (10.01)	3.85 (11.20)	0.08 (1.13)	1.35 (6.61)	0.00 (0.00)	0.13 (2.06)	0.58 (2.89)	20.37 (26.58)	13.80 (21.69)
L-cyhalothrin (0.003%) all sprays	13.73 (21.63)	13.28 (21.33)	2.84 (9.57)	2.14 (8.40)	0.09 (1.21)	1.19 (6.21)	0.00 (0.00)	0.10 (1.79)	0.61 (2.97)	22.26 (27.86)	20.26 (26.62)
Profenophos (0.05%) in all sprays	14.55 (22.25)	14.98 (22.72)	3.45 (10.62)	3.99 (11.44)	1.08 (5.94)	1.59 (7.18)	0.00 (0.00)	0.19 (2.46)	10.79 (19.13)	23.00 (28.32)	19.18 (25.79)

Untreated check	15.90 (23.40)	13.43 (21.42)	28.79 (32.31)	16.18 (23.67)	20.52 (26.86)	13.30 (21.25)	0.00 (0.00)	8.79 (17.06)	27.93 (31.17)	32.10 (34.29)	25.75 (30.47)
SEM (±)	0.81	0.68	0.63	0.69	0.38	0.82	0.00	0.51	0.84	1.73	1.10
CD (P=0.05)	2.68	2.05	1.90	2.08	1.15	2.47	0.00	1.54	2.53	5.21	3.32

Figure in the parentheses are angular transformed value.

4. Conclusion

The present study revealed that the insecticidal efficacy of Lambda cyhalothrin @ 0.003% and acetamiprid @ 0.01% were highest to minimize maximum insect pests attack in cashew. However the other insecticides were also found effective over the untreated check. So, from the investigation it has come to a conclusion that cashew trees treated with either lambda cyhalothrin @ 0.003% or acetamiprid @ 0.01% three times at flushing, panicle initiation and fruiting could avoid maximum insect pest damage in West Bengal. Application of 4% neem oil soap alternated with any of these insecticides could also be exploited as a part of integrated pest management programme of cashew.

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