

EFFICACY OF BOTANICALS AGAINST CASHEW TEA MOSQUITO BUG IN COASTAL KOAKAN REGION OF MAHARASHTRA

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ABSTRACT

The present study was conducted to determine the comparative toxicity of extracts of five locally available botanicals with chemical once against tea mosquito bug in cashew. Three sprays were applied at different stages at one month interval and post treatment observations were recorded at 7th and 15th days after each spray. Among the different botanicals and chemical insecticide were tested for controlling of frequent incidence of tea mosquito bug during flushing, panicle initiation and at the time of pea nut stage; the treatment T7 (Lambda cyhalothrin 0.003%) was found most effective and recorded least incidence after seventh days of spraying with 1.08, 1.56 and 1.68 per cent, while 1.20, 0.84 and 0.96 per cent after fifteen days. However, in case of various botanicals, the treatment T5 (custard apple seed extract 5%) showed comparatively minimum (1.08, 4.20 and 3.36 per cent, respectively) incidence after seventh day, whereas it was 1.80, 4.92 and 5.16 per cent, respectively at the end of fifteenth day on tea mosquito bug in cashew. The final evaluation of these treatments should be reserved until next cashew season trials have been conducted.

INTRODUCTION

The productivity of cashew is influenced by many of the factors; out of which insect pest incidence is major one. Though all the recommended sprays adopted, but excess use of insecticide causes the problem. Indiscriminate and injudicious use of conventional insecticide for management of pests has been causing different environmental hazards including resurgence, resistance and residue problem in food stuff (Sarkar *et al.*, 2015). The problems caused by synthetic pesticides and their residues have increased the need for effective biodegradable pesticides with greater selectivity. Alternative strategies have included the search for new types of pesticides which are often effective against tea mosquito bug, biodegradable into nontoxic products and are suitable for use in integrated pest management in cashew.

Botanical pesticides are good alternatives to chemical pesticides. These are the pesticides derived from the plant species. Some of these plant species possess one or more useful properties such as repellency, anti-feedant, fast knock down, flushing action, biodegradability, broad-spectrum of activity and ability to reduce insect resistance (Olaiifa *et al.*, 1987; Stoll, 1988) and maintain balanced bio-diversity of insect-pest (Ignacimuthu, 2004). Also, botanicals suppress some biological parameters such as egg laid/seed, egg laid/day, oviposition period, hatch ability, per cent adult formation and adult survivorship and also prolong some development stages (Maji *et al.*, 2014).

In short, global ecology is facing severe threat from the use of pesticides, so the search for ecologically safe methods to control tea mosquito bug in cashew is an awe inspiring field

of research.

Limonoids, are extremely bitter chemicals present in citrus seeds, act as antifeedants or antagonize ecdysone action in many species of coleopteran (Schultz, 1994). A variety of these plants contain secondary metabolites that show insecticidal activity against several coleopteran and dipterans species (Salvatore *et al.*, 2004). Methanol content in *Lantana camara* leaves responsible for maximum mortality of mosquito larvae (Kumar and Maneemegalai, 2008). Extract of ginger-garlic-chilli were found very effective against sucking pests in rice (Rao, 1997; Rani and Arivudainambi, 2014). Stachydrine alkaloid has responsible to paralyze the sucking pests (Guleria, 2009). Seed extracts of custard apple having anti-feedant and growth inhibitory effects against *Trogoderma granarium* (Rao, 2005).

Several groups of phytochemicals from different plants have been reported previously for their insecticidal activities. At present, a little or no work has been reported on botanicals against tea mosquito bug in cashew. Hence, the present investigation was carried out with an objective to determine the comparative toxicity of extracts of five locally available botanicals with chemical once against tea mosquito bug in cashew.

MATERIALS AND METHODS

A present studies entitled, "Efficacy of botanicals against cashew tea mosquito bug in coastal koakan region of Maharashtra" was carried out to evaluate the bio efficacy of various botanicals against tea mosquito bug at Regional Fruit Research Station, Vengurle Dist. Sindhudurg (MS) during the year 2015-16.

There were seven different treatments including five botanicals and one control and check with chemical insecticide statistically fitted in Randomized Block Design with four replications. The treatment details are as follow.

Treatment	Details
T ₁	Lemon peel extract 5%
T ₂	Lantana leaves extract 5%
T ₃	Chilli + garlic+ ginger extract 5%
T ₄	Chrysanthemum flower extract 5%
T ₅	Custard apple seed extract 5%
T ₆	Control
T ₇	Lambda cyhalothrin 0.003%

Preparation of 5 % of aqueous extract of botanicals

50 grams each of shade dried lemon peel, custard apple seeds and bulb of garlic + fresh green chill + ginger were ground with the help of mixture grinder by adding little quantity of water. Later, the mixture was squeezed through muslin cloth and the volume was made up to one liter so as to obtain 5 per cent solution as per the procedure given by Kayande *et al.* (2015).

Similarly, in case of Chrysanthemum flower and Lantana leaves extract, 2 kg of shed dried flowers as well as leaves, flowers and unripe fruits of lantana chopped and grounded by adding water. The mixture was squeezed through muslin cloth and the volume was made up to one liter so as to obtain 5 per cent solution as per the procedure given by Kayande *et al.* (2015).

Application of Spray

Total three sprays were applied at different stages of plant at one month interval and observations were recorded at seven days and fifty days interval.

For recording of incidence of tea mosquito bug; 52 leaders

shoot were selected at four side of canopy and label individually. Pretreatment observations were recorded one day prior to each spray while; the post treatment observations were recorded at 7th and 15th days after each spray. The extent of damage to the shoots and panicles was scored in 0-4 scale on the basis of the number and nature of necrotic lesions (Ambika *et al.*, 1979) as given below.

0	No Damage
1	1 to 3 necrotic streak/lesion on the shoot /panicle including apple and nut
2	4 to 6 necrotic streak/lesion on the shoot /panicle including apple and nut
3	Above six coalescing or non coalescing lesion/streak on shoot /panicle including apple and nut
4	Lesion /streak confluent or wilting or drying of affected shoot /panicle including apple and nut

The data recorded and converted into % incidence of cashew tea mosquito bug using the formula given below

$$\% \text{ incidence} = \frac{\text{Sum of numerical rating}}{\text{No. of shoots observed} \times \text{maximum rating}} \times 100$$

Period of spray (three sprays)

First spray – At flushing stage

Second spray – At panicle initiation stage

Third spray – At pea nut stage

RESULTS

The data on cumulative incidence of cashew tea mosquito bug after seven days of all three sprays presented in Table 1. All the treatments varied significantly against incidence of tea mosquito bug. It is revealed from data that, all the treatments reduced the incidence of tea mosquito bug over control. The treatment T₇ (Lambda cyhalothrin 0.003%) reduce the

Table 1: Efficacy of different botanicals against tea mosquito bug incidence during the year 2015-16

Treatment		% incidence of tea mosquito bug (7 th day after spray)		
		First spray	Second spray	Third spray
T ₁	Lemon peel extract 5%	4.44(12.00)	8.89(17.29)	8.29(16.49)
T ₂	Lantana leaves extract 5%	2.40(8.74)	6.73(14.99)	5.52(13.51)
T ₃	Chilli + garlic+ ginger extract 5%	3.00(9.83)	6.24(14.40)	7.21(15.53)
T ₄	Chrysanthemum flower extract 5%	1.80(7.54)	4.92(12.88)	5.16(13.07)
T ₅	Custard apple seed extract 5%	1.08(5.48)	4.20(11.75)	3.36(10.82)
T ₆	Control	9.13(17.37)	11.02(19.35)	12.13(20.31)
T ₇	Lambda cyhalothrin 0.003%	1.08(5.40)	1.56(6.92)	1.68(7.26)
S _{Em} ±		0.968	0.492	0.494
CD at 5%		2.873	1.461	1.467

Figure in parenthesis are arcsine value

Table 2: Efficacy of different botanicals against tea mosquito bug incidence during the year 2015-16

Treatment		% incidence of tea mosquito bug (15 th day after spray)		
		First spray	Second spray	Third spray
T ₁	lemon peel extract 5%	3.84(11.17)	8.17(16.53)	7.81(15.99)
T ₂	Lantana leaves extract 5%	1.92(7.43)	5.64(13.67)	5.04(12.90)
T ₃	Chilli + garlic+ ginger extract 5%	2.64(9.15)	6.24(14.40)	6.61(14.84)
T ₄	Chrysanthemum flower extract 5%	1.68(7.35)	4.20(11.75)	4.20(11.75)
T ₅	Custard apple seed extract 5%	1.68(7.76)	3.36(10.44)	3.12(10.06)
T ₆	Control	9.49(17.86)	18.61(25.45)	14.66(22.47)
T ₇	Lambda cyhalothrin 0.003%	1.20(6.11)	0.84(4.69)	0.96(9.66)
S _{Em} ±		0.875	0.761	0.729
CD at 5%		2.597	2.259	2.164

Figure in parenthesis are arcsine value

incidence of tea mosquito bug 1.08, 1.56 and 1.68 per cent, respectively after seven days of all three sprays and was found at par with the treatment T₅ (Custard apple seed extract 5%) and T₄ (Chrysanthemum flower extract 5%) after first spray on vegetative flush.

While, botanicals tested for the management of cashew tea mosquito bug, the treatment T₅ (Custard apple seed extract 5%) was found best. It reduced the incidence up to 1.08, 4.20 and 3.36 per cent after first, second and third spray, respectively and was found at par with the treatment T₄ (Chrysanthemum flower extract 5%) after first spray on vegetative flush and second spray on flowering panicle. The treatment T₄ found second best treatment for the management of tea mosquito bug. It reduced the incidence 1.80, 4.92 and 5.16 per cent, respectively and was found at par with the treatment T₂ (Lantana leaves extract 5%) and T₃ (Chilli + garlic + ginger extract 5%) after first spray on vegetative flush. Similarly, with the treatment T₂ (Lantana leaves extract 5%) after third spray.

The data presented in Table 2 showed that the incidence of tea mosquito bug after fifteen days of spray was significantly varied among all the treatments. The treatment T₇ (Lambda cyhalothrin 0.003%) found the best for the management of tea mosquito bug in cashew. It reduced the incidence up to 1.20, 0.84 and 0.96, per cent, however, it was at par with the treatments T₅ (Custard apple seed extract 5%), T₄ (Chrysanthemum flower extract 5%), T₂ (Lantana leaves extract 5%) after first spray; while treatment T₃ and T₄ after third spray. Regarding botanicals, the treatment T₅ (Custard apple seed extract 5%), was found the best and reduced the incidence of tea mosquito bug 1.68, 3.36, 3.12 per cent and was at par with the treatments T₄, T₂ & T₃ after first spray and T₄ after second and third spray each. The treatment T₄ (Chrysanthemum flower extract 5%) was found second best treatment for the management of tea mosquito bug it reduced the incidence up to 1.68, 4.20 & 4.20 per cent and was at par with the treatment T₂ (Lantana leaves extract 5%) and T₃ (Chilli + garlic + ginger extract 5%) after first spray and treatment T₂ (Lantana leaves extract 5%) after second and third spray and with treatment T₅ (Custard apple seed extract 5%).

DISCUSSION

Most of the botanicals are not truly pesticides since many are merely insect deterrents and their effect was slow. Also these are rapidly degraded by UV light so that residual action is short. Similarly, not all plant pesticides are less toxic to other animals than synthetic once (Wakeli, 2013).

Most of the botanical pesticides generally degrade within few days and some time with in few hours. These pesticides need to be applied more frequently. More frequent application coupled with higher costs of production makes botanicals more expensive to use than conventional pesticides (Guleria and Tiku, 2009).

Similar finding was also reported by Jalgaonkar *et al.* (2009) and Smitha and Pushpalatha (2014) for lambda cyhalothrin. The efficacy of Lambda Cyhalothrin (0.003%) against tea mosquito bug was also proved by Bhat and Raviprasad (2007). Gurusubramanian *et al.* (2008) reported that the aqueous solution of leaves of *Annona* showed antifeedent activity

(66.82%) against *Helopeltis*. Mamun and Ahmed (2011) reported that, the botanical extract of *Annona* seed, chrysanthemum flowers, lantana leaves extract found alternative for the management *Helopeltis* spp in Tea.

Also, similar findings was in line with Kalmegh (2008) that, among various botanicals and chemical insecticide tested in brinjal, the treatment of cypermethrin (0.006%) showed minimum shoot infestation after 15 days of spraying.

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