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BIOINTENSIVE MANAGEMENT OF TEA MOSQUITO BUG *HELOPELTIS* SPP. IN MORINGA

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ABSTRACT

Field experiments were conducted during 2018-19 and 2019-20 in moringa gardens at Usilampatti Block, Madurai District, Tamil Nadu with seven biopesticides viz., neem oil 3%, NSKE 5%, azadirachtin/ neemazal 3,000 ppm, pungam oil 3%, fish oil rosin soap 25 g/ l, *Beauveria bassiana* 10^8 CFU/ ml and *Lecanicillium lecanii* 10^6 CFU/ ml to evaluate their efficacy against tea mosquito bug *Helopeltis* spp. Among these, *B. bassiana* 10^8 CFU/ ml was found to be the most effective.

Key words: Tea mosquito bug, moringa, neem oil, NSKE, neemazal, pungam oil, fish oil rosin soap, *Beauveria bassiana, Lecanicillium lecanii*, efficacy, yield

The tea mosquito bug is an injurious pest on guava fruits. Besides guava, it is a major pest of tea, cashew, cocoa, avocado, apple, grapes, moringa, silk cotton, pepper, cinchona, ber, camphor, tamarind and neem trees. The miracle tree, moringa is susceptible to many insect pests of which the tea mosquito bug *Helopeltis antonii* (Sign.) (Hemiptera: Miridae) is the major one (Kotikal and Math, 2016). This pest is gaining importance as a pest on moringa in recent years. Its eggs are inserted in the midribs of young shoots. The nymphs and adults desap all plant parts such as terminal shoots and pods, remains active throughout the year, and lead to 100% crop loss if appropriate management strategies are not adopted. Timely execution of suitable control measures can minimize the losses. In general, application of insecticides like thiamethoxam, deltamethrin, clothianidin, thiacloprid and quinalphos are preferred. Control failures are more common in fields having a practice of sole application of synthetic insecticides. This is mainly due to development of insecticide resistance. Hence, an alternate strategy involving biopesticides is highly essential for tea mosquito bug management.

MATERIALS AND METHODS

Field experiments were conducted in moringa gardens at Usilampatti Block (9° 58' N, 77° 47' E) in a randomized block design with seven biopesticides. These treatments were replicated thrice to with three trees/ replication. The treatments include neem oil @ 3%, NSKE @ 5%, azadirachtin @ 3000 ppm, pungam oil @ 3%, fish oil rosin soap @ 25 g/ l, *Beauveria bassiana* @ 10^8 CFU/ ml, *Lecanicillium lecanii* @ 10^6 CFU/ ml and water spray. Two rounds of foliar sprays were given at fortnightly interval, one at new flush formation period and the second at 15 days after the first spray, using a high volume knapsack sprayer @ 500 l of spray fluid/ ha. Incidence of tea mosquito bug/ tree and damage % (shoot damage) were recorded from twenty twigs randomly selected/ tree. The above observations were recorded on a day prior to and 3rd, 7th and 14th days after spraying. The % reduction over control was worked out, with the shoot infestation graded in 0-4 scale as suggested by Ambika et al. (1979). Damage score 0: no lesions/ streaks; 1: 1 to 3 necrotic lesions/ streaks; 2: 4 to 6 coalescing or non-coalescing lesions/ streaks; 3: >6 coalescing or non- coalescing lesions/ streaks and 4: lesions/ streaks confluent or wilting affected shoots/ panicles.

RESULTS AND DISCUSSION

Based on the pooled data of 2018-19 and 2019-20, it was observed that the incidence of *Helopeltis* spp. differed significantly due to various treatments. Computation of means revealed that application of *B. bassiana* 10^8 CFU/ ml led to the least incidence of 7.90/ tree, that being statistically on par with the treatment of *L. lecanii* 10^6 CFU/ ml (9.24/ tree) and pungam oil 3% (10.37/ tree), as against maximum of 28.53/ tree untreated control. Thus, *B. bassiana* 10^8 CFU/ ml treatment significantly reduced the incidence (72.70%), and this was followed by *L. lecanii* 10^6 CFU/ ml (67.96

Table 1. Efficacy of botanicals and biopesticides on *Helopeltis antonii* in moringa (Pooled data, 2018-19 and 2019-20)

Tr. No.	Treatments	Counts (No./ tree) *							% Reduction over control	Damage (%)				% Reduction over control	Moringa yield (t/ ha)
		PT C	I Spray			II Spray				PTC	I Spray	II Spray	Mean		Cumulative mean
			3 DAS	7 DAS	14 DAS	3 DAS	7 DAS	14 DAS	Mean						
T_1	Neem oil 3 %	24.50	14.50 (3.81)^{b}	17.83 (4.22)^{b}	20.17 (4.49)^{b}	12.83 (3.58)^{b}	16.00 (4.00)^{b}	19.67 (4.44)^{b}	17.66 (4.20)^{c}	38.04	19.27	22.93 (28.6)^{d}	17.34 (24.6)^{e}	20.38 (26.8)^{cd}	28.62	15.10 (3.95)^{b}
T_2	NSKE 5 %	23.34	11.50 (3.39)^{a}	14.33 (3.79)^{b}	18.00 (4.24)^{b}	10.83 (3.29)^{b}	14.00 (4.14)^{b}	17.17 (4.14)^{b}	15.16 (3.89)^{b}	46.72	19.17	21.10 (27.3)^{c}	17.32 (24.6)^{c}	19.21 (26.0)^{e}	32.73	15.41 (3.99)^{b}
T_3	Azadirachtin/ Neemazal 3000 ppm	23.83	10.50 (3.24)^{a}	12.83 (3.58)^{a}	15.50 (3.94)^{a}	10.00 (3.16)^{b}	13.00 (3.81)^{b}	14.84 (3.85)^{b}	13.81 (3.72)^{b}	51.49	18.83	21.17 (27.4)^{c}	15.85 (23.5)^{d}	18.51 (25.5)^{c}	35.15	16.50 (4.12)^{b}
T_4	Pungam oil 3 %	24.33	8.67 (2.94)^{a}	10.00 (3.16)^{a}	11.17 (3.34)^{a}	7.00 (2.65)^{a}	8.67 (2.94)^{a}	10.33 (3.21)^{a}	10.37 (3.22)^{a}	64.02	19.33	20.50 (26.9)^{b}	13.13 (21.2)^{c}	16.82 (24.2)^{d}	41.03	17.24 (4.21)^{a}
T_5	Fish oil rosin soap 25 g/ L	25.67	15.00 (3.87)^{b}	19.66 (4.43)^{b}	22.00 (4.69)	14.16 (3.76)^{b}	17.00 (4.12)^{b}	20.00 (4.47)^{b}	18.73 (4.33)^{c}	34.26	21.33	24.50 (29.7)^{d}	20.33 (26.8)^{f}	22.42 (28.3)^{d}	21.51	14.67 (3.89)^{c}
T_6	*Baeuveria bassiana* 10^{8} CFU/ ml	25.17	7.00 (2.65)^{a}	7.67 (2.77)^{a}	9.00 (3.0)^{a}	4.50 (2.12)^{a}	5.17 (2.27)^{a}	6.00 (2.45)^{a}	7.90 (2.81)^{a}	72.70	20.50	17.00 (24.4)^{a}	7.50 (15.9)^{a}	12.25 (20.5)^{a}	57.03	18.25 (4.33)^{a}
T_7	*Lecanicillium lecanii* 10^{6}CFU/ ml	23.17	7.33 (2.71)^{a}	8.83 (2.97)^{a}	10.00 (3.16)^{a}	6.17 (2.48)^{a}	7.50 (2.7)^{a}	9.00 (3.0)^{a}	9.24 (3.04)^{a}	67.96	20.00	19.47 (26.2)^{b}	9.84 (18.3)^{b}	14.65 (22.5)^{b}	48.64	17.77 (4.27)^{a}
T_8	Water spray	24.67	25.50 (5.05)^{c}	27.00 (5.20)^{c}	27.83 (5.28)^{c}	29.00 (5.39)^{c}	31.33 (5.60)^{c}	32.00 (5.66)^{c}	28.53 (5.34)^{d}	0.00	19.50	26.50 (31.0)^{e}	30.60 (33.6)^{g}	28.55 (32.3)^{e}	0.00	12.56 (3.61)^{d}
	SEd	-	0.44	0.41	0.54	0.51	0.46	0.49	0.41	-	-	0.58	0.49	0.55	-	0.54
	CD	**NS	0.91	0.84	1.10	1.04	0.94	1.01	0.84	-	*NS	1.19	1.00	1.12	-	0.12

*Each value is the mean of three replications; **NS – Non significant; DAS-Days after spraying; Figures in parentheses square root transformed values; In a column, means followed by common letter(s) not significantly different by LSD at p = 0.05%.

%) and pungam oil (64.02 %) (Table 1). Pooled data revealed that *B. bassiana* 10^8 CFU/ ml led to the least damage of 12.25% compared to 28.55% in untreated control. The next best treatments were *L. lecanii* 10^6 CFU/ ml (14.65%) and pungam oil 3% (16.82 %). Maximum yield was obtained with *B. bassiana* 10^8 CFU/ ml (18.25 t/ ha), *L. lecanii* 10^6 CFU/ml (17.77 t/ ha) and pungam oil 3 % (17.24 t/ ha) and these were statistically on par with each other (Table 1).

Beauveria bassiana is a potential biological control agent against *H. antonii* causing 100% mortality in bioassay studies (Patil and Naik, 2004); and against the tea mosquito bug, *H. theivora* in Assam (Hazarika et al., 2009). Minimum number of tea mosquito bugs were observed with *B. bassiana* treatment (Manimaran et al., 2019); and @ 2.5 g/ l of water significantly reduces the leaf damage (56.00%) caused by tea mosquito bug (Ghatak et al., 2008) As, moringa is being pollinated by bees, insecticide spraying during flowering season is not advisable. Hence alternative strategy like use of biopesticides, *B. bassiana* 10^8 CFU/ ml could be recommended.

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