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REASEARCH NOTE

Efficacy of certain insecticides against Jasmine gallery worm, *Elasmopalpus jasminophagus* (Hampson) (Lepidoptera: Pyralidae)

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ABSTRACT: Six insecticides were evaluated against bud borer, *Elasmopalpus jasminophagus* in *Jasminum multiflorum* Andre. Mean per cent affected buds was lowest in chlorantraniliprole 18.5 SC (6.80) which was significantly superior as compared to rest of the treatments, followed by flubendiamide 480 SC (8.62) which was on par with spinosad 45 SC (9.83), quinolphos 25 EC (11.90). NSKE 5 per cent (13.53) and *Beauveria bassiana* 1 x 10^8 spores/g (14.23) were found less effective as compared to the chemical insecticides and were on par with each other. Chlorantraniliprole 18.5 SC was most effective with regard to flower yield (1975.11 kg/ha) followed by flubendiamide 480 SC (1728.22 kg/ha), spinosad 45 SC (1530.71 kg/ ha). The B:C ratio was highest in case of chlorantraniliprole 18.5 SC @ 0.1 ml/lt (1:3.47) followed by flubendiamide 480 SC @ 0.2ml/ lt (1:2.72).

Keywords: *Beauveria bassiana,* chemical insecticides, *Elasmopalpus jasminophagus*, flower yield, Jasmine bud borer/ gallery worm, NSKE

Jasmine constitute a group of fragrant flowers which are commercially grown throughout the country over an area of about 8000 hectares. Jasmine is vulnerable to attack by a number of insect and mite pests. Of them, the bud borer/gallery worm, *Elasmopalpus jasminophagus,* (Lepidoptera: Phycitidae) is a serious pest which causes webbing of terminal leaves, shoots and flowers. Four to five larvae can be seen with in a single flower cluster and the buds are webbed together by silken threads in which excreta are found attached and causes about 30-70 per cent reduction in flower yield (Gunasekaran, 1989). To evaluate the best insecticides against this gallery worm, the present study was undertaken.

Field experiment was conducted at the Department of Horticulture, College of Agriculture, Navile, UAHS, Shivamogga, India to manage bud borer, *E. jasminophagus*. Seven treatments including control, (Table 1) were imposed in Randomized Block Design with three replications each with three tagged bushes. The mature and damaged buds were removed after counting the total and damaged buds from such labelled bushes at the time of observations. The insecticides were sprayed with hand operated knapsack sprayer over labeled bushes of each treatment.

The observations were made one day before and 2, 7 and 14 days after each (two sprays) spray. The per cent affected buds were recorded at each observation and data obtained were subjected to ANOVA using Web Agri Stat Package (WASP-2) developed by Indian Council of Agricultural Research, research complex, Goa. Cost benefit ratio of various chemical treatments imposed for the management of bud borer, *E. jasminophagus* was worked out.

Data were transformed by Arc transformation before subjecting to ANOVA. Results of the field trail on the effectiveness of six insecticides against bud borer are presented in Table 1. Prior to treatment imposition, the mean per cent affected buds ranged from 22.95 to 27.73 per plant and was statistically non-significant in different treatment plots.

There was significant difference among the treatments at two days after spray. All the treatments recorded significantly lower damage of bud borer than untreated check. The lowest mean per cent affected buds due to bud borer was recorded in chlorantraniliprole 18.5 SC @ 0.1 ml/lt (14.95) which was on par with flubendiamide 480 SC @ 0.2ml/lt (16.05), spinosad 45 SC @ 0.3ml/lt (17.42). The next best treatments were, quinolphos 25 EC @ 2ml/lt (19.99), *Beauveria bassiana* 1 x 10^8 spores/g @ 1g/lt (20.77), NSKE 5 per cent (21.03) which were on par with each other.

At seven days after first spray, chlorantraniliprole 18.5 SC was found superior which recorded lowest mean per cent affected buds (5.90), followed by flubendiamide 480 SC (7.95), spinosad 45 SC (8.27) and quinolphos 25 EC (10.69), which were on par with each other. The least effective treatments were NSKE 5 per cent (12.03) and *Beauveria bassiana* (13.77). At 12 days also the trend was similar. The chlorantraniliprole 18.5 SC recorded lowest mean per cent affected buds (6.15) which was significantly superior over the other treatments, followed by flubendiamide 480 SC (8.12) which was on par with spinosad 45 SC (9.28).

There was significant difference among the treatments at 2 days after second spray. Chlorantraniliprole 18.5 SC recorded lowest mean per cent affected buds (5.98) which was significantly superior over the other treatments which was followed by flubendiamide 480 SC (7.48) and spinosad 45 SC (8.75) which were on par with each other. Next best treatment was quinolphos 25 EC (10.27). NSKE 5 per cent and *Beauveria bassiana* 1 x 10^8 spores/ g recorded the mean per cent affected buds of 12.65 and 12.65, respectively which were on par with each other.

All the treatments recorded significantly lower damage due to bud borer as compared to untreated control. The lowest per cent affected buds (4.33), was recorded in chlorantraniliprole 18.5 SC which was significantly superior over other treatments, followed by flubendiamide 480 SC (6.47) and spinosad 45 SC (8.08) which were statistically on par with each other. The next best treatments were quinolphos 25 EC (10.01) and NSKE 5 per cent (11.37) which were on par with each other. The least control was recorded in *Beauveria bassiana* 1 x 10^8 spores /g (12.69).

The mean per cent affected buds was lowest in chlorantraniliprole 18.5 SC (6.80) which was significantly superior compared to rest of the treatments, followed by flubendiamide 480 SC (8.62) which was on par with spinosad 45 SC (9.83), quinolphos 25 EC (11.90). Whereas, NSKE 5 per cent (13.53) and *Beauveria bassiana* 1 x 10^8 spores/g (14.23) were on par with each other.

The descending order of effectiveness of treatments based on per cent reduction of affected buds over untreated check was chlorantraniliprole 18.5 SC @ 0.1 ml/lt (72.34%) > flubendiamide 480 SC 0.2ml/lt (64.74%) > spinosad 45 SC @ 0.3ml/lt (59.76%) > quinolphos 25 EC @ 2 ml/lt (51.19%) > NSKE 5 per cent (45.65%) > *Beauveria bassiana* 1 x 10^8 spores/g @ 1g/lt (42.51%) (Table 1).

Sudhir (2002) reported that effective control of bud borer was obtained by spraying indoxacarb 14.5 SC at 0.0073 per cent and spinosad 45 SC at 0.023 per cent. Roopini (2016) reported that out of the eight insecticides evaluated for control of bud borer in field, mean larval population was significantly lower in chlorantraniliprole 18.5 SC @ 0.1 ml/lt, next best was spinosad 45 SC @ 0.2 ml/lt and quinolphos 25 EC @ 2 ml/lt was found inferior.

NSKE 5 per cent was on par with *Beauveria bassiana,* Pillai *et al.*, (2016) reported that topical application of *Beauveria bassiana* significantly reduced the survival rates of jasmine bud borer or gallery worm, *E. jasminophagus* at both 2.5x10^7 and 2x10^9 conidia per ml. B:C ratios varied from 1.42 to 3.47 among treatments. The highest benefit-cost ratio of 3.47 was recorded with chlorantraniliprole 18.5 SC followed by flubendiamide 480 SC (2.72). Chlorantraniliprole 18.5 SC resulted in maximum flower yield (1975.11 kg/ha) followed by flubendiamide 480 SC (1728.22 kg/ha).

Chlorantraniliprole was found most effective in reducing the borer damage, which is a new green labelled anthranilic diamide insecticide developed with a novel mode of action. It activates ryanodine receptors via stimulation of the release of calcium stores from the sarcoplasmic reticulum of muscle cells (i.e., for chewing insect pests) causing impaired regulation, paralysis and ultimately death of sensitive species (Cordova *et al.,* 2006). The differential selectivity of chlorantraniliprole is towards insect ryanodine receptors that explains the outstanding profile of low mammalian toxicity. It is active on chewing pests primarily by ingestion and secondarily by contact, and shows good ovilarvicidal and larvicidal activity (Bassi *et al.*, 2007). Since in jasmine ecosystem more number of natural enemies play an important role

Table 1. Efficacy of insecticides against jasmine bud borer, *Elasmopalpus jasminophagus* on jasmine during *kharif* 2016-17

Treatment	Dosage/lt	Mean per cent affected buds / nine bushes							Mean	Reduction over control (%)	Yield kg/ha	B:C ratio
		First Spray				Second Spray						
		1 DBS	2 DAS	7 DAS	12 DAS	2 DAS	7 DAS	12 DAS				
Quinolphos 25 EC	2 ml	22.95 (28.58)	19.99 (26.55)[ab]	10.69 (19.05)[bc]	11.06 (19.38)[bcd]	10.27 (18.66)[bc]	9.38 (17.7)[bc]	10.01 (18.38)[bc]	11.90[c]	51.19	1333.20	1.95
Spinosad 45 SC	0.3ml	22.89 (28.56)	17.42 (24.66)[b]	8.27 (16.69)[bc]	9.28 (17.72)[cde]	8.75 (16.99)[cd]	7.21 (15.45)[bc]	8.08 (16.48)[bcd]	9.83[d]	59.76	1530.71	2.09
Chlorantraniliprole 18.5 SC	0.1ml	27.73 (31.77)	14.95 (22.6)[b]	5.90 (13.82)[c]	6.15 (14.35)[e]	5.98 (14.14)[d]	3.51 (10.57)[d]	4.33 (11.16)[d]	6.80[e]	72.34	1975.11	3.47
Flubendiamide 480 SC	0.2ml	25.87 (30.54)	16.05 (23.54)[b]	7.95 (16.22)[bc]	8.12 (16.5)[de]	7.48 (15.7)[cd]	5.65 (13.72)[cd]	6.47 (14.62)[cd]	8.62[d]	64.74	1728.22	2.72
NSKE 5%		24.51 (29.67)	21.03 (27.27)[ab]	12.03 (20.16)[b]	13.47 (21.34)[bc]	12.65 (20.8)[b]	10.67 (18.87)[ab]	11.37 (19.59)[bc]	13.53[b]	45.65	1135.69	1.63
Beauveria bassiana 1 x 10^8 spores/g	*1 g*	24.86 (29.85)	20.77 (26.97)[ab]	13.77 (21.66)[b]	14.43 (22.3)[b]	12.73 (20.83)[b]	11.02 (19.38)[ab]	12.69 (20.49)[b]	14.23[b]	42.51	1036.93	1.42
Untreated Check	—	23.90 (29.24)	26.44 (30.93)[a]	22.25 (27.8)[a]	24.54 (29.65)[a]	23.90 (29.26)[a]	23.80 (29.15)[a]	24.02 (29.35)[a]	24.15[a]	–	493.78	0.76
SEM±		1.24	1.54	1.86	1.29	1.05	1.57	1.87	0.077	—		
CD@ P= 0.05		3.81	4.79	5.65	3.98	3.22	4.83	5.77	0.22	—		
CV %		7.21	10.32	17.74	11.11	9.4	15.24	17.46	5.69	—		
F		NS	*	*	*	*	*	*	*	—		

Note: DBS – Days Before Spray, DAS – Days After Spray
Figures in parenthesis are Arc sine transformed values
Means in the columns followed by the same alphabet do not differ significantly by DMRT (P=0.05)

in tri-trophic interactions, usage of less toxic insecticides to non-target arthropods should be entertained.

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