Evaluation of selective botanicals and entomopathogens against Scirtothrips dorsalis Hood under polyhouse conditions on rose

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ABSTRACT

A polyhouse experiment was conducted to find out the efficacy of botanicals and entomopathogens against *Scirtothrips dorsalis* Hood on different stages of rose *viz.*, bud, half opened and full opened flower. Results revealed that among different stages of rose, half opened flower was found superior to control *S. dorsalis.* Among different botanicals NSKE (2%) was recorded 74.37 % mortality to thrips. Among different entomopathogens, *Heterorhabditis indica* (2000IJs/ml) was found next best to botanicals by recording 72.08% mortality of thrips and chlothianidin 50 WDG (0.06 g/l) was recorded 98.58 per cent mortality of thrips.

Key words: *Scirtothrips dorsalis*, NSKE, *Heterorhabditis indica*

INTRODUCTION

Rose universally known as the "Queen of flowers", is one of the natures beautiful creation and symbol of love, adoration and innocence. It is used in worshiping, making garlands and bouquet. Rose oil is used in ayurvedic medicine, perfuming soaps, cosmetics, flavoring soft drinks and alcoholic liquors. Rose water is used in medicine, confectionary, eye cautions and eye drops and it is sprinkled on guests at wedding and other social functions. Rose petals are used in making gulkand which is rich source of vitamin – A (Bose and Yadav, 1989). One of the major constraints in rose cultivation under polyhouse conditions is insect pests. Several insect pests are recorded on rose of which sucking insects like thrips, mite and scales are serious. Adults and nymphs of *Scirtothrips dorsalis* Hood inhabit under surface of tender leaves and flowers and suck sap from leaves and flower buds (Duraimurugan and Jagadish, 2011). Affected leaves are deformed with brown or silvery patches or with burnt margins (Bose and Yadav, 1989), and causes 28-95 per cent damage with a population density of 11-33 thrips per flower (Gahukar, 2003). Use of botanicals and entomopathogens seems to be the best alternatives to achieve desirable control of insect pests (Satyanarayan, 2006), particularly *S. dorsalis* (Seal and Kumar, 2010). It is therefore imperative to resort to other non-chemical pest management strategies such as use of organic amendments, botanical pesticides and bioagents (key components of organic farming), which are eco-friendly and completely safe to the consumers.

MATERIAL AND METHODS

In polyhouse similar aged buds, half opened and full opened flowers were tagged. These stages were exposed to different treatments *viz.*, NSKE (2%), aqueous leaf extract of *Pongamia glabra* (2 %), *Metarhizium anisopliae* (4 g/l), *Heterorhabditits indica* (2000 IJs / ml), clothianidin 50 WDG (0.06 g / l), water spray and control. Each treatment was replicated 5 times with each replication representing an individual bud, half opened and full opened flowers. Thus in each stage a total of 140 representing 4 sets were tagged. First set was used for pre count treatment. The above treatments were imposed on the remaining sets using one liter baby sprayer during evening hours. For post treatment count 3 sets in each stage were removed periodically on one, three and five days after spraying and were brought to the laboratory and recorded the number of live and dead thrips under microscope. The experiment was conducted at college of Agriculture, Raichur, Karnataka during 2006-08 (Plate 1).The data obtained was pooled converted to per cent mortality and subjected to simple RBD analysis.

Plate 1. Experimental set up in polyhouse

RESULTS

Thrips population did not vary significantly on a day before treatment imposition. However, the thrips population ranged from 25.00 to 27.60/bud. One day after spray of clothianidin 50 WDG recorded the lowest thrips population which was significantly superior over other treatments. Significantly highest thrips were recorded in control. Similar results were also recorded three days after the spray. Highest population was recorded by *M. anisopliae* and water spray with 24.20 and 26.40 thrips per bud respectively with 8.46 and 2.22 per cent mortality of thrips, respectively these were on par with control. Five days after spray, clothianidin 50 WDG was again superior by further reducing thrips population than *H. indica*, NSKE and aqueous leaf extract of *P. glabra*. Once again *M. anisopliae* and water spray failed to bring down thrips population and recorded as high as 22.60 and 26.80 thrips per bud with only 13.07 and 0.74 per cent mortality, respectively (Table 1).

The thrips population ranged between 56.20 to 58.20 per half opened flower did not differ significantly on a day before imposition of treatment. On first day after the treatment imposition clothianidin 50 WDG recorded a significantly lowest population of 15.60 thrips per half opened flower with highest mortality of 72.43 per cent compared to all other treatments. This was followed by NSKE, *H. indica* and aqueous leaf extract of *P. glabra*. However, *M. anisopliae* and water spray were least effective recording highest population of 57.00 and 57.40 thrips per half opened flower respectively and were on par with control. Similar trend was noticed on third and fifth day after spray with chemicals and borational botanical and microbials. However, water spray and control were ineffective recording highest thrips population over other treatments (Table 2).

Thrips population ranging from 45.20 to 56.80 thrips per full opened flower did not vary significantly on a day before imposition of treatments. On first day after spray significantly

Table 1. Effect of different treatments against S. dorsalis on rose bud under polyhouse conditions

Treatment No	Treatment	Dose	Number of thrips/bud				% Reduction		
			Pre count	Post count					
			I-DBS	I-DAS	III-DAS	V-DAS	I-DAS	III-DAS	V-DAS
T1	NSKE	2%	25.00 (5.04)	20.00 (04.58)b	20.00 (4.58)b	15.00 (4.0)c	20.00	20.00	40.00
T2	Aqueous leaf extract of *Pongamia glabra*	2%	26.60 (5.23)	24.20 (05.02)c	21.00 (4.69)b	20.00 (4.58)d	9.02	21.00	24.00
T3	*Metarhizium anisopliae*	$4gl^{-1}$	26.00 (5.13)	25.00 (05.10)c	24.20 (5.02)c	22.6 (4.86)e	3.80	8.46	13.07
T4	*Heterorhabditis indica*	2000 $IJsml^{-1}$	26.40 (5.21)	22.60 (04.86)c	19.00 (4.47)b	13.00 (3.74)b	14.39	28.03	50.00
T5	Clothianidin 50 WDG	$0.06gl^{-1}$	25.60 (5.14)	15.00 (04.00)a	9.20 (3.19)a	1.80 (1.66)a	41.40	64.00	92.96
T6	Water spray	-	27 (5.23)	24.60 (05.06)c	26.40 (5.27)c	26.80 (5.27)f	8.80	2.22	0.74
T7	Control	-	27.60 (5.32)	28.00 (05.38)d	26.00 (5.19)c	29.00 (5.48)f	-1.40	5.7	-5.07
	S.Em±		0.30	0.07	0.07	0.08			
	C.D. (p=0.05)		NS	0.22	0.23	0.23			
	C.V (%)		12.96	3.53	3.86	4.24			

DBS: Day before spray DAS: Days after spray Figures in parentheses are "X+1 transformation value
Values in the column followed by common letters are non significant at P = 0.05 as per DMRT
NS: Non significant at P = 0.05

Table 2. Effect of different treatments against S. dorsalis on half opened rose flowers under polyhouse conditions

Treatment No	Treatment details	Dose	Number of thrips/half opened flower				% Reduction		
			Pre count	Post count					
			I-DBS	I-DAS	III-DAS	V-DAS	I-DAS	III-DAS	V-DAS
T1	NSKE	2%	56.20 (7.54)	48.20 (7.01)b	36.20 (6.10)b	14.40 (03.92)b	14.23	35.58	74.37
T2	Aqueous leaf extract of *Pongamia glabra*	2%	57.60 (7.64)	50.40 (7.17)b	48.20 (7.01)c	30.00 (5.57)c	12.5	16.30	47.91
T3	*Metarhizium anisopliae*	$4gl^{-1}$	57.40 (7.64)	57.00 (7.61)c	50.40 (7.13)c	40.00 (6.40)d	0.69	12.19	30.00
T4	*Heterorhabditis indica*	2000 $IJsml^{-1}$	56.80 (7.58)	49.20 (7.08)b	38.60 (6.28)b	15.80 (04.09)b	13.3	32.04	72.18
T5	Clothianidin 50 WDG	$0.06gl^{-1}$	56.60 (7.54)	15.60 (4.06)a	12.80 (3.71)a	0.80 (01.31)a	72.43	77.38	98.58
T6	Water spray	-	58.20 (7.63)	57.40 (7.64)c	58.20 (7.69)d	59.60 (07.78)e	1.37	0.00	-2.40
T7	Control	-	57.40 (7.62)	57.00 (7.62)c	59.00 (7.75)d	60.80 (07.75)e	0.69	-2.70	-5.92
	S.Em ±		0.28	0.08	0.11	00.09			
	C.D. (p=0.05)		NS	0.24	0.34	0.27			
	C.V (%)		8.37	2.74	4.03	04.05			

DBS: Day before spray DAS: Days after spray Figures in parentheses are "X+1 transformation value
Values in the column followed by common letters are non significant at P = 0.05 as per DMRT
NS: Non significant at P = 0.05

lowest thrips population of 16.60 per full opened flower with highest mortality of 64.52 per cent was recorded in clothianidin 50 WDG compared to all other treatments. Similar trend was followed on third day and fifth also in which clothianidin 50 WDG recorded significantly lowest thrips population than botanicals and microbes. For instance *M. anisopliae* and water spray were least effective recording the highest population of 41.20 and 45.60 thrips per full opened flower. Invariably water spray was ineffective in bringing down the thrips population and was on par with control (Table 3).

DISCUSSION

The evaluation of Selective botanicals and Entomopathogens against *Scirtothrips dorsalis* Hood discussed as below. Effect of NSKE and neem products on *S. dorslais* has been reported by several workers. Varadharajan *et al.* (1997); Chandrasekaran and Veeravel (1998) recorded 53.00 per cent and 38.95 per cent reduction in *S. dorsalis* population by Achock (1% azardirachtin) and NSKE (5%) on *Capsicum annum* and chilli respectively which are in close agreement with the present study. Sanguttuvan (1999); Dadmal *et al.* (2001) recorded 28.00 and 61.37 per cent reduction in thrips population by 3 per cent neem oil and 5 per cent NSKE respectively which is contradictory to present study. Chandrasekaran and Veeravel (1998); Dadmal *et al.* (2000) recorded 72.94 per cent reduction and 66.18 per cent mortality in *S. dorsalis* in chilli by Achock 1.5% and 1%, respectively. This study provides important information about management of rose thrips, *Scirtothrips dorsalis* using various chemical and biorational insecticide. Recently, Kumar and Nandihalli (2009), the efficacy of neem oil, pongamia oil, NSKE, *Acorus calamus* rhizome extract, *Vitex negundo* leaf extract, *Verticillium lecanii* and *Metarhizium anisopliae* against spider mites *Scirtothrips dorsalis* on rose (cv. First Red) was evaluated under greenhouse conditions, and recommended pongamia oil for the management of the thrip.

Table 3. Effect of different treatments against S. dorsalis on full opened rose flowers under polyhouse conditions

Treatment No	Treatment details	Dose	Number of thrips/full opened flower				% Reduction		
			Pre count	Post count					
			I-DBS	I-DAS	III-DAS	V-DAS	I-DAS	III-DAS	V-DAS
T1	NSKE	2%	48.60 (7.02)	29.00 (5.47)b	21.00 (4.69)b	12.40 (3.65)b	40.34	56.79	74.48
T2	Aqueous leaf extract of *Pongamia glabra*	2%	47.40 (6.93)	31.00 (5.65)bc	25.00 (5.09)c	21.00 (4.68)c	34.59	46.94	55.69
T3	*Metarhizium anisopliae*	4gl^{-1}	45.20 (6.75)	45.00 (6.78)d	41.20 (6.49)d	35.00 (5.99)d	0.44	8.84	22.56
T4	*Heterorhabditis indica*	2000 IJsml^{-1}	46.80 (6.85)	33.00 (5.83)c	26.00 (5.19)c	22.20 (4.80)c	29.18	44.20	52.36
T5	Clothianidin 50 WDG	0.06gl^{-1}	56.80 (6.89)	16.60 (4.16)a	12.80 (3.70)a	2.00 (1.72)a	64.52	72.64	95.72
T6	Water spray	-	47.40 (6.93)	48.40 (7.03)d	45.60 (6.82)e	49.40 (7.1)e	-2.10	3.79	-4.21
T7	Control	-	48.20 (7.0)	49.20 (7.08)d	50.40 (7.17)f	51.80 (7.26)e	-2.07	-4.56	-7.46
	S.Em ±		0.32	0.10	0.10	0.12			
	C.D. (p=0.05)		NS	0.15	0.29	0.37			
	C.V (%)		10.58	4.09	4.09	5.68			

DBS: Day before spray; DAS: Days after spray; Figures in parentheses are "X+1 transformation value
Values in the column followed by common letters are non significant at P = 0.05 as per DMRT
NS: Non significant at P = 0.05

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