



EFFICACY OF SOME INSECTICIDES AND BOTANICALS AGAINST SUCKING PESTS ON CAPSICUM UNDER NET HOUSE

SANDEEP KAUR AND SUBASH SINGH*

Department of Vegetable Sciences, Punjab Agricultural University, Ludhiana(Punjab)-141 004, India

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ABSTRACT

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Field efficacy of different insecticidal and botanical formulations was evaluated for the management of sucking pests on capsicum under net house conditions at Vegetable Research Farm, Punjab Agricultural University, Ludhiana during the year 2011. Sprays of different treatments viz. Asataf 75 SP (Acephate) @ 0.05 % and 0.10%, Decis 2.8 EC (deltamethrin) @ 0.025 % and 0.05 %, Confidor 17.8 SL (imidacloprid) @ 0.025 % and 0.05%, Neem Soap (*Azadirachta indica*) @ 1.0%, Pongamia Soap @ 1.0% were given for the control of aphid on 7.3.2011 and 18.3.2011. The sprays for the control of thrips and yellow mite were given on 13.5.2011, 3.6.2011 and 13.6.2011. The pooled data indicated that significantly low aphid counts/3 top clusters /plant (0.76-1.05) in treatments Neem Soap (*Azadirachta indica*) @ 1.0%, Pongamia Soap @ 1.0%, Confidor 17.8 SL (Imidacloprid) @ 0.025% and 0.05%, Asataf (Acephate) 75 SP @ 0.05 and 0.10% as against Decis 2.8 EC @ 0.025 and 0.05% (1.80-2.47) and control (1.77). Significantly low chilli thrips counts /top canopy/plant (0.03-0.06) were recorded in treatments confidor 17.8 SL (Imidacloprid) @ 0.05% and Asataf (Acephate) 75 SP @ 0.10% followed by Decis 2.8 EC @ 0.05% (0.12) and neem soap @ 1.0% (0.12) and other treatments (0.16-0.22) and control (0.28). Significantly lowest mean thrips rating (0.37-0.72) was observed in treatments Decis 2.8 EC @ 0.05%, Asataf 75 SP @ 0.10% and confidor 17.8 SL @ 0.05% followed by neem soap @ 1.0% (0.90) as against other treatments (1.10-1.45) and control (1.37). Out of these treatments, significantly lower mean yellow mite rating (2.42-2.45) was recorded in Decis 2.8 EC @ 0.05 %, confidor 17.8 SL @ 0.05% and neem soap @ 1.0% followed by pongamia soap @ 1.0% (2.85) in comparison to other treatments (3.02-3.27) and control (3.15). No treatment could give complete protection against yellow mite on capsicum in net house. Total yield per plant was achieved highest (0.215- 0.239 kg/plant) in Asataf 75 SP @ 0.10% and confidor 17.8 SL @ 0.05 % followed by neem soap @ 1.0% (0.203kg/plant) and other treatments (0.106-0.168 kg/plant) and control (0.091 kg/plant).

INTRODUCTION

Capsicum (*Capsicum annuum* var. *frutescens*) (family-Solanaceae), which is also known as sweet pepper, bell pepper or green pepper is one of the most popular and highly remunerative vegetable crops grown throughout the world. It differs from hot chilli in size, fruit shape, capsaicin content and usage. Nutritionally, it is rich in vitamins particularly, vitamins A and C. Hundred gram of edible portion of capsicum provides 24 k cal of energy, 1.3 g of protein, 4.3 g of carbohydrate and 0.3 g of fat (Anon., 2001). About 35 species of insect and mite pests reported in capsicum, a few viz., thrips (*Scirtothrips dorsalis* Hood, *Thrips palmi* Karny), aphids (*Aphis gossypii* Glover., *Myzus persicae* Sulzer), whitefly (*Bemisia tabaci* Gennadius), fruit borers (*Helicoverpa armigera* Hubner), mites (*Polyphagotarsonemus latus* Banks, *Tetranychus cinnabarinus* Boisd.) and other minor pests (Vos and Frinking, 1998, Sorensen, 2005, Berke *et al.*, 2003) under Punjab conditions pose severe problems. Sunitha (2007) has also revealed the occurrence of aphids, thrips and mites as major pests in capsicum. Osman and El-Keie (1975) in their investigations

reported the presence of *T. cinnabarinus* as most important pest on capsicum. Krishna Kumar (1995), Krishna Kumar *et al.* (1996), Vasicek *et al.* (2001), and Eswara Reddy and Krishna Kumar (2006) reported *S. dorsalis* as a serious pest of chilli and sweet pepper in India. Similarly Eswara Reddy (2005) reported that chilli mite, *P. latus* and thrips, *S. dorsalis* as the major pests infesting sweet pepper both under protected and open field conditions. Asena (1974), Yasaraknc and Hncal (1997), Halima and Hamouda (1994) reported that aphids are the major pests of capsicum. According to Sanap and Nawale (1987), adult and nymphs of *S. dorsalis* suck the cell sap of leaves, causing rolling of the leaf upward and leaf size reduction. At present, repeated applications and indiscriminate use of different pesticides by the farmers for the control of chilli pests has led to the development of resistance in whitefly, aphid and mite. In order to impede the development of insecticide resistance it is always advisable to use insecticides from different classes in rotation. The present investigations were,

* Corresponding author email: subashent@gmail.com

therefore, planned to evaluate efficacy of some insecticides and botanicals against sucking pests on capsicum under net house.

MATERIALS AND METHODS

The studies on “efficacy of some insecticides and botanicals against sucking pests on capsicum under net house” were carried out at Vegetable Research Farm, Punjab Agricultural University, Ludhiana, during year 2011. Capsicum hybrid was transplanted in February, 2011 under net house. The trials were laid out in randomized block design. Two sprays of different insecticides modules were conducted for the control of aphid on 7.3.2011 and 18.3.2011 (Table 1), whereas three sprays of same treatments were given for the control of thrips and yellow mite on 13.5.2011, 3.6.2011 and 13.6.2011 (Table 2). Need based sprays were given for aphid, thrips and yellow mite control in all the modules except control treatment. Details of different modules under study are given below.

Treatments for aphid control- Two sprays at various per cent concentrations in each module viz. Asataf 75 SP (Acephate) @ 0.05 % (M1) and 0.10% (M2), Decis 2.8 EC (deltamethrin) @ 0.025 % (M3) and 0.05 % (M4), Confidor 17.8 SL (imidacloprid) @ 0.025 % (M5) and 0.05% (M6), Neem Soap (*Azadirachta indica*) @ 1.0 % (M7), Pongamia Soap @ 1.0% (M8), and untreated control (M9) were given against aphid on capsicum as in Table 1.

Treatments for thrips and yellow mite control- Three sprays at various per cent concentrations in each module viz. Asataf 75 SP (Acephate) @ 0.05 % (M1) and 0.10% (M2), Decis 2.8 EC (deltamethrin) @ 0.025 % (M3) and 0.05 % (M4), Confidor 17.8 SL (imidacloprid) @ 0.025 % (M5) and 0.05% (M6), Neem Soap (*Azadirachta indica*) @ 1.0 % (M7), Pongamia Soap @ 1.0% (M8), and untreated control (M9) were conducted for the control of thrips and yellow mite (Table 2). Thrips counts /top canopy/plant and yellow mite rating were made at 3 DAS, 7 DAS and 10 DAS of first and second sprays, whereas at 3 DAS and 7 DAS of third spray.

The aphid population was counted from the three top clusters /plant at 3 DAS, 7 DAS and 10 DAS and compared with untreated control. Data on ratings for thrips and mite were also recorded on 28.5.2011 and 9.6.2011. At each harvest during 2011, weight of healthy fruits of capsicum in each plot was recorded at each picking and fruit yield (kg/plant) was worked out.

RESULTS AND DISCUSSION

Present studies revealed significant differences among different modules with respect to aphid, thrips and yellow mite control on capsicum during 2011 and the results are discussed below.

Aphid Population

Significant low aphid counts/3 top clusters/plant were registered in different modules over the control during 2011 (Table 1). In first spray on 3 DAS, the data was non-significant.

On 7 DAS of first spray, Pongamia Soap @1.0% (M8) with 0.13 was significantly more effective against aphid followed by with Neem Soap @ 1.0% (M7) with 0.18, Asataf @ 0.10% (M2) with 0.35, Asataf @ 0.05% (M1) with 0.43, Confidor @ 0.05% (M6) with 0.63 and Confidor @0.025% with 0.73 mean aphid no./ 3 top clusters/ plant as compared with other modules (2.55-3.42) and untreated control, M9 (1.75). On 10th day of first spray, significantly low aphid population (0.48) for Pongamia @1.0% (M8), followed by Asataf @ 0.10% (M2) with 0.78 and Neem Soap @ 1.0 % (M7) with 0.87 was recorded as compared with other modules (1.40-3.00) and untreated control, M9 (2.55). Mean of first spray revealed significantly low aphid counts i.e., 0.59, 0.61, 0.69 and 0.90 respectively in Asataf @ 0.10% (M2), Neem soap @ 1.0 % (M7), Confidor @ 0.05% (M6) and Asataf @ 0.05 % (M1) sprays. In second spray on 3 DAS, significantly no aphid population (0.00) was recorded for modules M1 and M2 (Asataf) and M6 (Confidor). Pongamia soap (M8), Neem soap (M7) and Confidor (M5) gave significantly better control of aphids (0.03-0.09) as compared with other modules (1.55-2.92) and untreated control, M9 (1.38). On 7th of second spray, no aphid counts (0.00) were recorded in Asataf (M2), followed by Confidor (M6) with 0.02, Neem soap (M7) with 0.03, Pongamia soap (M8) with 0.10 and Confidor (M5) with 0.12, Asataf (M1) with 0.15 as against other modules (0.58-1.05) and untreated control, M9 (0.98). Mean of second spray revealed significantly low aphid counts i.e., 0.20, 0.26, 0.47, 0.56, 0.58 and 0.64 respectively in Pongamia soap (M8), Asataf (M2), Confidor (M6), Asataf (M1),) as against Decis (M3) and untreated control, M9 (0.98). There was no aphid population records made on 10DAS in second spray.

The pooled data indicated that significantly low aphid counts/3 top clusters /plant (0.72-1.05) in treatments, Neem Soap (*Azadirachta indica*) @ 1.0%, Pongamia Soap @ 1.0%, Confidor 17.8 SL (Imidacloprid) @ 0.025% and 0.05%, Asataf (Acephate) 75 SP @ 0.05 and 0.10% were registered as against Decis 2.8 EC @ 0.025 and 0.05% (1.80-2.47) and control (1.77).

Thrips population

First two sprays of insecticides and botanicals under study (Table2) for the control of thrips on capsicum gave non-significant results on 3 DAS, 7 DAS and 10 DAS. But, in third spray, on 3 DAS low thrips counts/top canopy/plant (0.00-0.07) were reported significantly for Asataf @ 0.10% (M2), Confidor @ 0.05 % (M6) and Neem soap @ 1.0 %, Asataf @ 0.05 % and Decis @ 0.025 % as against other treatments (0.30-0.45) and untreated control, M9 (0.45). On 7 DAS, no population (0.00) was reported for Asataf (M2) and Confidor (M6), whereas significantly low thrips population (0.05-0.12) in Neem soap (M7), Decis (M4), Asataf (M1) and Decis (M3) was registered as against other modules (0.25-0.27) and control, M9 (0.32).

Table 1: Efficacy of different treatments on aphid population on capsicum in net house during 2011

Module	Chemical	% Conc.	No. of aphids/3 top clusters /plant						
			First Spray on 7.3.2011			Second Spray on 18.3.2011			Pooled mean
			3 DAS	7 DAS	10 DAS	3 DAS	7 DAS	10 DAS	
M1	Asataf 76 SL (Acephate)	0.05	0.72 (1.30)	0.43 (1.18)	1.54 (1.53)	0.00 (1.00)	0.15 (1.07)	0.00	0.93 (1.34) ^a
M2	Asataf 76 SL (Acephate)	0.10	0.65 (1.27)	0.35 (1.16)	0.78 (1.32)	0.00 (1.00)	0.00 (1.00)	0.00	0.72 (1.27) ^a
M3	Decis 2.8 EC (deltamethrin)	0.025	1.30 (1.51)	3.42 (2.09)	3.00 (1.99)	2.92 (1.85)	1.05 (1.40)	0.00	2.47 (1.81) ^{bc}
M4	Decis 2.8 EC (deltamethrin)	0.05	1.23 (1.49)	2.55 (1.88)	2.20 (1.79)	1.55 (1.58)	0.58 (1.24)	0.00	1.80 (1.65) ^b
M5	Confidor 17.8 SL (Imidacloprid)	0.025	0.88 (1.36)	0.73 (1.28)	1.53 (1.57)	0.09 (1.05)	0.12 (1.05)	0.00	1.05 (1.38) ^a
M6	Confidor 17.8 SL (Imidacloprid)	0.05	0.78 (1.33)	0.63 (1.23)	1.40 (1.50)	0.00 (1.00)	0.02 (1.01)	0.00	0.91 (1.33) ^a
M7	Neem Soap (<i>Azadiracta indica</i>)	1.0	1.03 (1.42)	0.18 (1.09)	0.87 (1.33)	0.03 (1.01)	0.03 (1.01)	0.00	0.76 (1.29) ^a
M8	Pongamia Soap	1.0	1.22 (1.48)	0.13 (1.06)	0.48 (1.21)	0.03 (1.01)	0.10 (1.05)	0.00	0.87 (1.31) ^a
M9	Control	-	1.42 (1.55)	1.75 (1.64)	2.55 (1.87)	1.38 (1.54)	0.98 (1.40)	0.00	1.77 (1.65) ^b
	CD ($P=0.05$)	-	NS	(0.35)	(0.41)	(0.42)	(0.22)	-	(0.13)
	C.V.%	-	12.06	17.26	18.02	23.92	13.49	-	15.82

* Figures in parentheses are sq. root transformed values.

The pooled data indicated that significantly low aphid counts/3 top clusters /plant (0.72-1.05) in treatments Neem Soap (*Azadiracta indica*) @ 1.0%, Pongamia Soap @ 1.0%, Confidor 17.8 SL (Imidacloprid) @ 0.025% and 0.05%, Asataf (Acephate) 75 SP @ 0.05 and 0.10% was registered as against Decis 2.8 EC @ 0.025 and 0.05% (1.80-2.47) and control (1.77).

In second spray on 3 DAS, significantly no thrips population (0.00) was recorded for modules M1 and M2 (Asataf) and M6 (Confidor). Pongamia soap (M8), Neem soap (M7) and Confidor (M5) gave significantly better control of thrips (0.03-0.09) as compared with other modules (1.55-2.92) and untreated control, M9 (1.38). On 7th of second spray, no thrips counts (0.00) were recorded in Asataf (M2), followed by Confidor (M6) with 0.02, Neem soap (M7) with 0.03, Pongamia soap (M8) with 0.10 and Confidor (M5) with 0.12, Asataf (M1) with 0.15 as against other modules (0.58-1.05) and untreated control, M9 (0.98). Mean of second spray revealed significantly low thrips counts i.e., 0.20, 0.26, 0.47, 0.56 respectively in Pongamia soap (M8), Asataf (M2), Confidor (M6), Asataf (M1),) as against Decis (M3) and untreated control, M9 (0.98). There was no thrips population records made on 10 DAS in second spray (Table 2).

The pooled data revealed significantly low thrips counts /top canopy/plant (0.03-0.06) for Confidor @ 0.05% followed by Asataf (Acephate) 75 SP @ 0.10%, Decis 2.8 EC @ 0.05% (0.12) and Neem soap @ 1.0% (0.12) as against other modules (0.16-0.22) and control (0.28) (Table 2).

Thrips and Yellow mite rating

Significantly lowest mean thrips rating (0.37-0.72) was observed in treatments Decis 2.8 EC @ 0.05%, Asataf 75 SP @ 0.10% and Confidor 17.8 SL @ 0.05% followed by Neem soap

@ 1.0% (0.90) as against other modules (1.10-1.45) and control (1.37). Out of these treatments, significantly low mean yellow mite rating (2.42-2.45) was recorded in Decis 2.8 EC @ 0.05 %, Confidor 17.8 SL @ 0.05% and Neem soap @ 1.0% followed by Pongamia soap @ 1.0% (2.85) in comparison to other treatments (3.02-3.27) and control (3.15). However, no treatment could give complete protection against yellow mite on capsicum in net house (Table 3).

Total yield

Total yield per plant was achieved highest (0.215- 0.239 kg/plant) in Asataf 75 SP @ 0.10% and Confidor 17.8 SL @ 0.05 % followed by Neem soap @ 1.0% (0.203 kg/plant) and other treatments (0.106-0.168 kg/plant) and control (0.091 kg/plant) as in Table 3.

The present investigations regarding the confidor as the second most effective molecule after neem soap are in accordance to Gundannavarm *et al.* (2007) who reported neem cake most effective when superimposed with some organics and insecticides against aphids, thrips and mites on chilli under field conditions and he also revealed it to give better yield results. Effectiveness of neem derivatives against sucking pests has been documented by various workers (Varghese and Giraddi, 2005, Giraddi and Smitha, 2004, Mallikarjun Rao and Ahmed, 1986 and Mallikarjun Rao *et al.* 1999a and 1999b), which lend support to the present findings. Seal *et al.* (2009b) reported that various formulations of imidacloprid used as either soil drench or foliar application provide effective control of *S. dorsalis* on chilli without harming natural control agents. He also reported it to suppress *S. dorsalis* populations for many days. Imidacloprid gives the best result against *S. dorsalis* when used as a soil drench on pepper (Seal *et al.* 2008).

Table 2: Efficacy of different treatments on thrips on capsicum in net house during 2011

Module	Treatment/ Dose	% Conc.	No. of thrips/top canopy/plant after									
			First Spray (on 13.5.2011)			Second Spray (on 3.6.2011)			Third Spray (on 13.6.2011)			Pooled mean
			3 DAS	7 DAS	10 DAS	3 DAS	7 DAS	10 DAS	3 DAS	7 DAS		
M1	Asataf 76 SL (Acephate)	0.05	0.00 (1.00)	0.30 (1.13)	0.15 (1.07)	0.10 (1.05)	0.15 (1.07)	0.30 (1.13)	0.20 ^{abc} (1.09)	0.10 ^{abc} (1.05)	0.16 ^{bc} (1.07)	
M2	Asataf 76 SL (Acephate)	0.10	0.00 (1.00)	0.00 (1.00)	0.00 (1.00)	0.05 (1.02)	0.10 (1.05)	0.30 (1.13)	0.00 ^a (1.00)	0.00 ^a (1.00)	0.06 ^a (1.02)	
M3	Decis 2.8 EC(deltamethrin)	0.025	0.03 (1.02)	0.15 (1.07)	0.10 (1.04)	0.15 (1.07)	0.25 (1.11)	0.45 (1.20)	0.20 ^{abc} (1.09)	0.12 ^{abc} (1.06)	0.18 ^{bc} (1.08)	
M4	Decis 2.8 EC (deltamethrin)	0.05	0.02 (1.01)	0.05 (1.02)	0.05 (1.02)	0.00 (1.00)	0.25 (1.11)	0.40 (1.18)	0.10 ^{ab} (1.05)	0.07 ^{ab} (1.04)	0.12 ^{ab} (1.05)	
M5	Confidor 17.8 SL (Imidacloprid)	0.025	0.07 (1.03)	0.35 (1.13)	0.10 (1.05)	0.06 (1.03)	0.25 (1.11)	1.40 (1.17)	0.30 ^{bc} (1.14)	0.25 ^{bcd} (1.11)	0.22 ^{cd} (1.10)	
M6	Confidor 17.8 SL (Imidacloprid)	0.05	0.03 (1.02)	0.00 (1.00)	0.10 (1.04)	0.00 (1.00)	0.00 (1.00)	0.10 (1.05)	0.00 ^a (1.00)	0.00 ^a (1.00)	0.03 ^a (1.01)	
M7	Neem Soap (<i>Azadiracta indica</i>)	1.0	0.00 (1.00)	0.35 (1.15)	0.20 (1.09)	0.00 (1.00)	0.15 (1.07)	0.10 (1.05)	0.10 ^{ab} (1.05)	0.05 ^{ab} (1.02)	0.12 ^{ab} (1.05)	
M8	Pongamia Soap	1.0	0.12 (1.05)	0.35 (1.16)	0.20 (1.09)	0.10 (1.05)	0.00 (1.00)	0.05 (1.02)	0.45 ^c (1.20)	0.27 ^{cd} (1.13)	0.19 ^{bcd} (1.09)	
M9	Control	-	0.15 (1.07)	0.25 (1.11)	0.35 (1.16)	0.15 (1.07)	0.20 (1.09)	0.40 (1.83)	0.45 ^c (1.20)	0.32 ^d (0.15)	0.28 ^d (1.13)	
	CD (P=0.05)	-	NS	NS	NS	NS	NS	NS	(0.12)	(0.09)	(0.04)	
	C.V.%	-	3.79	9.09	8.20	5.23	8.22	9.66	7.59	6.05	7.57	

* Figures in parentheses are sq. root transformed values.

Table 3: Effect of different treatments on sucking pests and total yield of capsicum in net house 2011

Module	Treatment	% Conc.	Thrips Rating			Yellow Mite Rating			Total Yield/ plant
			28.5.2011	9.6.2011	Mean	28.5.2011	9.6.2011	Mean	
M1	Asataf 76 SL (Acephate)	0.05	0.95 ^c	1.70 ^{bcd}	1.35 ^d	2.8	3.75 ^e	3.27 ^b	0.147 ^c
M2	Asataf 76 SL (Acephate)	0.10	0.45 ^{ab}	0.95 ^a	0.70 ^{ab}	2.75	3.35 ^{cde}	3.05 ^b	0.215 ^a
M3	Decis 2.8 EC(deltamethrin)	0.025	0.70 ^{bc}	2.20 ^d	1.45 ^d	2.90	3.20 ^{cde}	3.05 ^b	0.135 ^{cd}
M4	Decis 2.8 EC (deltamethrin)	0.05	0.05 ^a	0.70 ^a	0.37 ^a	2.50	2.35 ^{ab}	2.42 ^a	0.168 ^{bc}
M5	Confidor 17.8 SL(Imidacloprid)	0.025	0.50 ^b	1.70 ^{bcd}	1.10 ^{cd}	3.05	3.00 ^{abcd}	3.02 ^b	0.106 ^{de}
M6	Confidor 17.8 SL (Imidacloprid)	0.05	0.20 ^{ab}	1.25 ^{ab}	0.72 ^b	2.60	2.30 ^a	2.45 ^a	0.239 ^a
M7	Neem Soap (<i>Azadiracta indica</i>)	1.0	0.20 ^{ab}	1.60 ^{bc}	0.90 ^{bc}	2.50	2.40 ^{ab}	2.45 ^a	0.203 ^{ab}
M8	Pongamia Soap	1.0	0.55 ^{bc}	1.85 ^{cd}	1.20 ^{cd}	2.85	2.85 ^{abc}	2.85 ^{ab}	0.139 ^{cd}
M9	Control	-	0.99 ^c	1.75 ^{bcd}	1.37 ^d	2.60	3.70 ^{de}	3.15 ^b	0.091 ^e
	CD (P=0.05)	-	0.44	0.58	0.36	NS	0.71	0.43	0.37

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