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EVALUATION OF INSECTICIDES AGAINST THRIPS IN CHILLI

Prajna Prakash Mishra, Arundhati Sasmal[1,*] and Kailash Chandra Samal[2]

Department of Entomology; [1]Regional Research and Technology Transfer Station, Coastal Zone;
[2]Department of Agricultural Biotechnology College of Agriculture,
Odisha University of Agriculture and Technology, Bhubaneswar 751003, Odisha, India
*Email: sasmalarundhati@gmail.com (corresponding author)

ABSTRACT

Field efficacy of some novel insecticides was evaluated against chilli thrips *Scirtothrips dorsalis* (Hood) . Acetamiprid 20SP, spinosad 45SC, fenpyroximate 5EC, emamectin benzoate 5SG, fipronil 80WG, spiromesifen 22.9SC, diafenthiuron 50WP, acephate 75 SP and dimethoate 30EC were included. Among these, fipronil 80WG and spiromesifen 22.9SC were found superior with least incidence (0.98 and 1.04 thrips/ leaf, respectively) and 75.6 and 74.1% reduction over untreated control, respectively. Spiromesifen 22.9SC led to maximum reduction in leaf curl and fruit curl (84.6 and 83.1%, respectively) with maximum chlorophyll content in leaves and green chilli yield (93.85 q/ ha).

Key words: Chilli thrips, *Scirtothrips dorsalis* (Hood), acetamiprid, spinosad, fenpyroximate, emamectin benzoate, fipronil, spiromesifen, diafenthiuron, acephate, dimethoate, leaf curl, fruit curl, chlorophyll content, yield

Chilli (*Capsicum annum* L.) is one of the important commercial vegetable crops in India. It is used as both green and ripe as spice crop. It has a great export potential. Its cultivation and production is affected by a number of biotic and abiotic factors. Among the insect pests, thrips *Scirtothrips dorsalis* (Hood) are the most destructive causing a significant yield loss of 11 to 32% (quantitative) and 88% (qualitative) in chilli (Kumar et al., 2015; Jadhao et al*.,* 2016). Nymphs and adults suck the sap from tender foliage and lacerate the leaf tissue, growing shoots, flowers and fruits resulting in upward curling of leaves, drooping of flowers prematurely and scaring on the fruits. The present study was undertaken to evaluate the efficacy of some novel insecticides against *S. dorsalis* (Hood) under field condition.

MATERIALS AND METHODS

Field trial to evaluate the efficacy of insecticides was conducted at the Regional Research and Technology Transfer Station, Odisha University of Agriculture and Technology, Bhubaneswar, Odisha in two consecutive kharif seasons 2017 and 2018. Chilli (cv. Utkal Ava) was used. Seed treatment with imidachloprid 600FS @5ml/ kg of seed was included in all the treatments except untreated control. Then seeds were sown in the nursery bed. Another nursery bed was sown with untreated seeds. The seedlings of 25 days old were transplanted in a plot size of 5.0x 4.5 m with row spacing of 50 cm. The seedlings from treated nursery bed were planted in all the treatment plots except untreated control. Seedlings from untreated nursery bed were planted in the plots of untreated control. The recommended package of practices except plant protection was followed. The details of treatments (T_1-T_{10}) are given in Table 1. The spray solution was freshly prepared every time and sprayed with hand compression knapsack sprayer. Two sprays were given during entire crop season once at 30 days after transplanting (DAT) and repeated at 45 DAT. The observations on nymphs and adults of thrips from 5 randomly selected plants were made. Count of thrips (nymphs and adults) was taken on three tender leaves (One from the top, middle and lower canopy) from each plant one day prior to insecticidal application, as pretreatment count and at 5, 10 and 15 DAT. Number of leaves and curled leaves were observed in five randomly selected plants and % was calculated. Similarly, the weight of curled fruits was recorded at harvesting and % fruit curl was calculated. The yield of marketable green chillies was recorded from each picking, and with all pickings, yield/ ha was calculated. The chlorophyll content was estimated at 5 DAT by preparing homogenate of 0.5g of leaf sample in 50 ml of 80% acetone. Then the content was centrifuged and supernatant was collected and then absorbance was measured at 430, 645 and 663 nm. The quality of pigments was calculated after standard formula (Arnon, 1949). All the data were subjected to statistical analysis using ANOVA.

RESULTS AND DISCUSSION

Observations on *S. dorsalis* incidence, leaf curl and fruit curl damage revealed that all the insecticidal

Table 1. Efficacy of insecticides against *S. dorsalis*, leaf and fruit curl, and yield in chilli (kharif, 2017 & 2018)

Treatments	*Number of thrips/ leaf						**Leaf curl (%)				**Fruit curl (%)				*Chlorophyll content of leaves		Green chilli yield (q/ha)		
	Kharif, 2017		Kharif, 2018		Pooled mean	% reduction of thrips	Kharif, 2017 Mean	Kharif, 2018 Mean	Pooled mean	% reduction in leaf curl	Kharif, 2017 Mean	Kharif, 2018 Mean	Pooled mean	% reduction in fruit curl	Chlorophyll a (mg/ g)	Chlorophyll b (mg/ gm)	Kharif, 2017	Kharif, 2018	Pooled mean yield
	Pre-count	Mean	Pre-count	Mean															
T_1= Acetamiprid 20 SP @10g a.i./ ha	3.24 (2.06)	1.55 (1.60)	3.42 (2.10)	1.89 (1.70)	1.72 (1.65)	57.2	20.50 (26.90)	19.80 (26.40)	20.15 (26.65)	58.8	15.70 (23.33)	18.70 (25.61)	17.20 (24.47)	40.2	0.0323 (1.016)	0.0160 (1.008)	76.68	74.12	75.40
T_2= Spinosad 45 SC @73 g a.i./ha	3.62 (2.15)	1.01 (1.42)	4.15 (2.27)	1.47 (1.57)	1.24 (1.50)	69.1	16.80 (24.14)	18.30 (25.30)	17.55 (24.72)	64.1	9.50 (17.92)	10.20 (18.59)	9.85 (18.25)	65.7	0.0340 (1.017)	0.0204 (1.026)	87.25	86.75	87.00
T_3= Fenpyroximate 5 EC @30 g a.i./ ha	3.55 (2.13)	2.89 (1.97)	4.38 (2.32)	2.83 (1.96)	2.86 (1.97)	28.8	18.60 (25.52)	20.40 (26.81)	19.50 (26.16)	60.2	16.50 (23.95)	15.80 (23.40)	16.15 (23.68)	43.8	0.0250 (1.012)	0.0091 (1.005)	78.64	83.94	81.29
T_4= Emamectin benzoate 5 SG @10g a.i./ ha	3.20 (2.05)	2.94 (1.98)	3.91 (2.22)	2.67 (1.92)	2.80 (1.95)	30.3	25.30 (30.18)	22.60 (28.36)	23.95 (29.27)	51.1	20.60 (26.97)	17.50 (24.71)	19.05 (25.84)	33.7	0.0216 (1.011)	0.0102 (1.005)	82.37	78.57	80.47
T_5= Fipronil 80 WG @50g a.i./ ha	2.82 (1.95)	0.79 (1.34)	3.95 (2.22)	1.17 (1.47)	0.98 (1.41)	75.6	10.50 (18.83)	8.20 (16.60)	9.35 (17.72)	80.9	6.70 (14.96)	8.00 (16.41)	7.35 (15.68)	74.4	0.0312 (1.015)	0.0129 (1.006)	88.41	87.23	87.82
T_6= Spiromesifen 22.9 SC @96g a.i./ ha	3.18 (2.04)	1.03 (1.42)	3.62 (2.15)	1.06 (1.43)	1.04 (1.43)	74.1	8.00 (16.31)	7.10 (15.32)	7.55 (15.81)	84.6	5.20 (13.16)	4.50 (12.21)	4.85 (12.69)	83.1	0.3244 (1.151)	0.3274 (1.152)	94.57	93.13	93.85
T_7= Diafenthiuron 50 WP @300 g a.i./ ha	2.95 (1.99)	1.13 (1.46)	3.84 (2.20)	1.36 (1.54)	1.24 (1.50)	69.1	11.20 (19.54)	10.50 (18.89)	10.85 (19.21)	77.8	7.80 (16.17)	6.90 (15.17)	7.35 (15.68)	74.4	0.3768 (1.173)	0.3440 (1.159)	86.5	87.00	86.75
T_8= Acephate 75 SP @500g a.i./ha	2.75 (1.94)	1.65 (1.63)	3.93 (2.22)	1.93 (1.71)	1.79 (1.67)	55.5	27.20 (31.41)	30.40 (33.42)	28.80 (32.42)	41.2	19.60 (26.26)	20.60 (26.97)	20.10 (26.62)	30.1	0.0336 (1.017)	0.0154 (1.008)	75.73	81.53	78.63
T_9= Dimethoate 30 EC @300 g a.i./ ha	3.07 (2.02)	1.85 (1.69)	4.16 (2.27)	2.25 (1.80)	2.05 (1.75)	49	25.60 (30.38)	28.90 (32.50)	27.25 (31.49)	44.3	18.70 (25.60)	19.80 (26.39)	19.25 (26.00)	33	0.0250 (1.111)	0.0091 (1.005)	72.65	77.07	74.86
T_{10}= Untrated control	3.40 (2.10)	4.00 (2.24)	3.81 (2.19)	4.05 (2.25)	4.02 (2.24)	57.2	42.50 (40.67)	55.40 (48.08)	48.95 (44.37)	58.8	30.50 (33.50)	27.00 (31.29)	28.75 (32.396)	40.2	0.0165 (1.008)	0.0093 (1.005)	60.24	59.06	59.65
SE(m)±	0.009	0.013	0.009	0.010	0.010		0.785	0.922	0.881		0.541	0.696	0.629		0.019	0.004	1.758	1.634	1.171
C D (p=0.05)	NS	0.03	NS	0.03	0.03		2.35	2.76	2.53		1.62	2.08	1.81		0.056	0.013	5.26	4.89	3.36

*Figures in parentheses square root transformed values; ** Figures in parentheses angular transformed values

treatments are significantly superior than untreated control; in kharif 2017, fipronil 80WG gave maximum and significant reduction in incidence (0.79 thrips/ leaf) followed by spinosad 45SC (1.01 thrips/ leaf) and spiromesifen 22.9SC (1.03 thrips/ leaf); similarly, during kharif 2018, spiromesifen 22.9SC was superior (1.06 thrips/ leaf) followed by fipronil 80WG (1.17 thrips/ leaf). Considering both years data, fipronil 80WG and spiromesifen 22.9SC led to the least incidence (0.98 and 1.04 thrips/ leaf, respectively) with 75.6 and 74.1% reduction over untreated control. These observations are in confirmity with those on fipronil against sucking pests of chilli and giving more yield (Jadhav et al., 2004; Rajkumar et al., 2005; Reddy et al., 2009; Rohini et al., 2012; Tukaram et al., 2017; Sanghamitra et al., 2018; Sahu and Kumar, 2018). The efficacy of spiromesifen corroborates with that of Varghese et al. (2013). During kharif, 2017 the least leaf curl (8.0%) was observed with spiromesifen 22.9SC; and fipronil 80WG and diafenthiuron 50WP were at par; and in 2018, spiromesifen 22.9SC and fipronil 80WG were found equally effective with minimum leaf curl damage (7.1 and 8.2%, respectively); maximum reduction (84.6%) was observed with spiromesifen 22.9SC, while fipronil 80WG led to 80.9% reduction. Spiromesifen 22.9SC is thus the most effective against fruit curl damage (Table 1). These findings on spiromesifen 22.9EC agree with earlier ones (Kavitha et al., 2006; Nagaraj et al., 2007; Varghese et al., 2013).

About chlorophyll content, it was revealed that plants with spiromesifen 22.9SC and diafenthiuron 50WP revealed more content; but these observations are contrary to those Sinha et al. (2015) who observed reduced chlorophyll content with endosulfan and dimethoate. The fruit yield was maximum with spiromesifen 22.9SC (93.85q/ ha) followed by fipronil 80WG, spinosad 45SC and diafenthiuron 50WP (Table 1). These results are in confirmity with those of Baladhiya et al. (2018) on spiromesifen 22.9%SC. Similar results were also obtained by Deepak et al. (2019) in chilli with fipronil 5%+ buprofezin 20SC. Thus, seed treatment with imidacloprid 600FS @5ml/ kg followed by foliar spray of fipronil 80WG @50g a.i./ ha or with spiromesifen 22.9SC @96g a.i./ ha at 30 and 45DAT proved to be effective against chilli thrips. However, spiromesifen 22.9SC also led to the least leaf curl and fruit curl damage along with more green chilli yield.

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