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## Bio Efficacy of pyriproxyfen 10 % EC against thrips, *Thrips tabaci* and jassids, *Amrasca biguttula biguttula* (Ishida) infesting chilli crop

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**Abstract**

A field experiment was conducted to evaluate insecticide Pyriproxyfen 10% EC 75 g a.i @ 750, 1000, 1250 ml for controlling thrips, *Thrips tabaci* and jassids, *Amrasca biguttula biguttula* (Ishida) infesting chilli crop with other treatments i.e., Imidacloprid 17.8% SL and Fenprothrin 30% EC including untreated control at Horticulture Farm, Rajasthan college of agriculture, Udaipur during *Kharif* 2016 and 2017, subsequently. All among the treatments, Pyriproxyfen 10% EC @ 1250 ml/ha followed by Imidacloprid 17.8% SL 50 g a.i. @ 250 ml/ha found the most effective to reduce the thrips, *Thrips tabaci* and jassids, *Amrasca biguttula biguttula* (Ishida) population in chilli crop during both years, *Kharif* 2016 and 2017.

**Keywords:** *Thrips tabaci*, *Amrasca biguttula biguttula* (Ishida), chilli, pyriproxyfen and sucking pests

**Introduction**

Chilli (*Capsicum annuum* L.) belongs to the family Solanaceae is an important spice cum vegetable crop commonly used in Indian dietary. It is grown throughout the year as a cash crop and used in green and red ripe dried stage for their pungency, colour and other ingredients in all culinary preparations of rich and poor alike to impart taste, flavor and colour. Nutritionally, it is a rich source of vitamin A, B and C. Capsaicin an alkaloid responsible for pungency in chilli has medicinal properties and it prevents heart attack by dilating the blood vessels (Gill, 1989) [4]. India is the largest consumer and exporter of chilli in the world with It is being cultivated in 173 lakh hectare area with the production of 1992.0 lakh metric tons and productivity of 11.5 metric tons per ha (Anonymous 2016) [2]. In India, it is intensively cultivated in Andhra Pradesh, Maharashtra, Karnataka, Tamil Nadu, Rajasthan and in hilly areas of Uttar Pradesh (Ratnakumari *et al.*, 2001) [8]. In Rajasthan, it is cultivated in an area of 12.21 thousand hectares with an annual production of 17.71 million tons (Anonymous, 2013) [3]. The major chilli growing districts of Rajasthan include Jodhpur, Swai Madhopur, Pali, Jalore, Bhilwara, Jaipur, Ajmer, Tonk, Udaipur and Bharatpur. Nearly 35 species of insect pests occur on chilli which includes thrips, aphid, whitefly, fruit borer, cutworm, plant bug, mite and other minor pests. Among all the sucking pests attacking chilli whitefly, *Bemisia tabaci* (Gennadius) and thrips, *Scirtothrips dorsalis* Hood are dominant pests. The estimated loss due to sucking pests was up to 30 to 50 per cent (Varadharajan *et al* 1994) [10]. Insecticide application is one of the management options that can substantially reduce yield losses caused by sucking insects. Bioefficacy of newer pesticides needs to be studied for formulating effective and economical management strategies of insect pests. Therefore, the present investigation was conducted to evaluate the bioefficacy of certain newer insecticides against sucking insect pests infesting chilli.

**Materials and Method**

The experiment on the bioefficacy of pyriproxyfen 10 % EC against thrips and jassids was conducted in Randomized Block Design with three replications at Horticulture farm, R.C.A., Udaipur during *Kharif*, 2016 and 2017. Chilli variety (Gopika) was transplanted on 17<sup>th</sup> August 2016 and 5<sup>th</sup> April 2017, respectively. Sowing was done in plots each measuring 3.80 x 3.15 m<sup>2</sup> at row to row and plant to plant spacing of 60 X 60 cm<sup>2</sup>. There were six treatments replicated three times. Each treatment was applied two times initiating first spray as soon as a pest's infestation starts and subsequent second spray was given at 14 days interval. The Pyriproxyfen 10% EC 75 g.a.i @ 750, 1000, 1250 ml and other treatments i.e., Imidacloprid 17.8%SL 50 g.a.i. @ 250 ml, Fenprothrin 30% EC 100 g.a.i @ 340 ml were applied against sucking pests of chilli i.e. Thrips, *Thrips tabaci* and jassids *Amrasca biguttula biguttula*

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(Ishida) under field condition at Horticulture farm, Rajasthan college of Agriculture (Udaipur) during the year *Kharif*, 2016 and 2017. The observation on the population thrips and jassids were recorded on top, middle and lower per plant (3 leaves / plant) on five randomly selected and tagged plants. The observation was recorded one day before and at 3, 7, 10 and 14 days after each spray and mean reduction in population was calculated at 3, 7, 10 and 14 days after each sprays.

The percent corrected mortality of the pests was calculated from the formula given by Henderson and Tilton (1955)<sup>[5]</sup>:

$$\text{Percent corrected mortality} = 100 \left[ 1 - \frac{T_a \times C_b}{T_b \times C_a} \right]$$

T<sub>a</sub> = Number of insects after treatment,

T<sub>b</sub> = Number of insects before treatment

C<sub>a</sub> = Number of insects in control after treatment

C<sub>b</sub> = Number of insects in control before treatment

## Result and Discussion

### Thrips

The data recorded on mean reduction in the population of thrips at 3, 7, 10 and 14 days after first and second sprays have been presented in Table 2 and 3. The population of thrips recorded before spray showed non-significant difference among different treatments indicated that its population was uniformly distributed in all the experimental plots in both the seasons. The data reveals that all the treatments were found significantly superior to untreated control. The highest mean reduction in the population of thrips was recorded in case of two spray of Pyriproxyfen 10% EC @ 1250 ml/ha which resulted 79.31, 76.94, 73.03, 70.50; 81.59, 76.81, 72.12 and 69.56 and 81.32, 78.97, 75.08, 72.52; 83.55 78.82, 74.13 and 71.51 per cent reduction in mean population of thrips at 3, 7, 10 and 14 days after first and second spray during *Kharif*, 2016 and 2017 respectively.

Spray of Imidacloprid 17.8% SL at 250 ml/ha was found at par to above treatment which caused 77.32, 74.71, 70.23, 67.59; 78.77, 73.14, 71.27 and 67.45; 79.33, 76.74, 72.28, 69.60; 80.79, 75.91, 73.29 and 69.42 per cent reduction in mean population of thrips at 3, 7, 10 and 14 days after first and second spray during *Kharif*, 2016 and 2017 respectively. It was followed by Pyriproxyfen 10% EC @ 1000 ml/ha which resulted 70.19, 67.64, 67.19, 64.29; 72.16, 71.70, 67.39 and 65.07; 72.21, 69.65, 69.20, 66.30; 74.17, 73.66, 69.40 and 67.64 per cent reduction in thrips population at 3, 7, 10 and 14 days after first and second spray during *Kharif*, 2016 and 2017, respectively and followed by Fenprothrin 30% EC @ 340 ml/ha which caused 69.54, 67.60, 64.71, 62.75; 71.51, 67.48, 65.49 and 62.97; 71.56, 69.68, 66.76, 64.76; 73.53, 69.50, 67.51 and 64.98 per cent reduction in thrips population at 3, 7, 10 and 14 days after first and second spray during *Kharif*, 2016 and 2017, respectively followed by Pyriproxyfen 10% EC @ 750 ml/ha which resulted 63.01, 62.62, 63.10, 58.80; 67.82, 67.42, 64.42 and 61.56; 65.02, 64.65, 65.11, 60.82; 69.84; 70.05, 66.43 and 63.96 per cent reduction in thrips population at 3, 7, 10 and 14 days after first and second spray during *Kharif*, 2016 and 2017, respectively. These findings are in accordance with the findings of Singh *et al* (2005)<sup>[11]</sup>, conducted a field experiment to evaluate the

insecticides for their bioefficacy against the different insect pests of chilli (*C. annuum*) cv. Pusa Sadabahar and the result showed that Imidacloprid 17.8 SL at 200 ml ha<sup>-1</sup> was the most effective against *S. dorsalis* and *Aphis gossypii*. Similarly Samota *et al* (2014) found that the imidacloprid was significantly effective to reduce the thrips population with 77.90%. Mishra *et al* (2005)<sup>[6]</sup> also recorded that Imidacloprid was most effective in suppressing the thrips population and increasing the pod yield of chilli. Patel (2013)<sup>[7]</sup> Studied on insect pest complex of brinjal, *Solanum melongena* (Linn.) and their control with insecticides and biopesticides and found that Pyriproxifen + fenpropethrin 500 ml/ha was most effective to reducing insect pests in brinjal after Emamectin benzoate @ 10 g.a.i/ha.

### Jassids

The data recorded on mean reduction in the population of jassids at 3, 7, 10 and 14 days after first and second sprays have been presented in Table 3 and 4. The data reveals that all the treatments were found significantly superior to untreated control. The highest mean reduction in the population of jassids was recorded in case of two spray of Pyriproxyfen 10% EC @ 1250 ml/ha which resulted 73.91, 73.55, 71.57, 68.67; 79.76; 76.96, 75.25 and 72.91; 81.21, 78.92, 74.95, 72.40; 83.10, 78.27, 73.58 and 71.02 per cent reduction in mean population of jassids at 3, 7, 10 and 14 days after first and second spray during *Kharif*, 2016 and 2017, respectively. Spray of Imidacloprid 17.8% SL at 250 ml/ha was found at par to above treatment which caused 70.57, 70.01, 68.14, 65.67; 75.63, 74.17, 73.29 and 71.03; 79.22 76.63 72.16, 69.49; 80.23, 74.60, 72.74 and 68.93 per cent reduction in mean population of jassids at 3, 7, 10 and 14 days after first and second spray during *Kharif*, 2016 and 2017, respectively. It was followed by Pyriproxyfen 10% EC @ 1000 ml/ha which resulted 69.26, 69.08, 64.84, 60.38; 73.57, 72.06, 67.66 and 65.78; 72.10, 69.54, 69.08, 66.18; 73.62, 73.17, 68.85 and 66.54 per cent reduction in jassids population at 3, 7, 10 and 14 days after first and second spray during *Kharif*, 2016 and 2017, respectively and followed by Fenprothrin 30% EC @ 340 ml/ha which caused 67.13, 63.55, 62.69, 60.90; 69.95, 68.75, 66.10 and 64.13; 71.45, 69.57, 66.65, 64.65; 72.98, 68.94, 66.96 and 64.43 per cent reduction in jassids population at 3, 7, 10 and 14 days after first and second spray during *Kharif*, 2016 and 2017, respectively followed by Pyriproxyfen 10% EC @ 750 ml/ha which resulted 60.75, 60.01, 57.46, 54.22; 65.94, 63.82, 59.73 and 53.40; 64.91, 64.53, 65.00, 60.71; 69.29, 68.87, 66.39 and 63.19 per cent reduction in jassids population at 3, 7, 10 and 14 days after first and second spray during *Kharif*, 2016 and 2017, respectively. The present studies are in accordance with the studies of Afzal *et al* (2014)<sup>[11]</sup> the study was conducted to determine comparative efficacy of new insecticides against whitefly, *Bemisia tabaci* (Genn.) and jassid, *Amrasca devastans* (Dist.) on cotton Bt- 121 and found that imidacloprid (confidor 20% SL) @ 250 ml/ acre proved to be the significantly effective insecticide against whitefly and Jassid up to seven days after application. Patel (2013)<sup>[7]</sup> observed that Pyriproxifen + fenpropethrin 500 ml/ha was most effective to reducing the infestation of jassid in brinjal after Emamectin benzoate @ 10 g.a.i/ha.

**Table 1:** Efficacy of Pyriproxyfen 10% EC against thrips on chilli during *Kharif*, 2016.

S. No.	Treatment	Dose (g/ml ha <sup>-1</sup> )	Mean reduction (%) in thrips population, days after spray								
			I <sup>st</sup> spray				II <sup>nd</sup> spray				
			PTP	3 day	7 day	10 day	14 day	3 day	7 day	10 day	14 day
1	Pyriproxyfen 10% EC	750	1.17	63.01 (52.54)	62.62 (62.64)	63.10 (52.60)	58.80 (50.07)	67.82 (55.44)	67.42 (55.19)	64.42 (53.38)	61.56 (61.61)
2	Pyriproxyfen 10% EC	1000	1.25	70.19 (56.91)	67.64 (67.64)	67.19 (55.05)	64.29 (53.31)	72.16 (58.15)	71.70 (57.86)	67.39 (55.17)	65.07 (65.07)
3	Pyriproxyfen 10% EC	1250	1.22	79.31 (62.94)	76.94 (77.00)	73.03 (58.71)	70.50 (57.11)	81.59 (64.60)	76.81 (61.21)	72.12 (58.13)	69.56 (69.56)
4	Imidacloprid 17.8%SL	250	1.14	77.32 (61.56)	74.71 (74.73)	70.23 (56.93)	67.59 (55.30)	78.77 (62.56)	73.14 (58.78)	71.27 (57.59)	67.45 (67.47)
5	Fenpropathrin 30% EC	340	1.19	69.54 (56.50)	67.60 (67.64)	64.71 (53.55)	62.75 (52.39)	71.51 (57.74)	67.48 (55.23)	65.49 (54.03)	62.97 (62.97)
6	Untreated control	-	1.28	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	SEm±			0.783	0.955	0.893	0.614	0.680	0.860	0.584	0.802
	C.D. at 5%			2.413	2.943	2.752	1.891	2.094	2.651	1.800	2.473

PTP = Pre treatment population.

Figures in parenthesis are angular arcsine value

**Table 2:** Efficacy of Pyriproxyfen 10% EC against thrips on chilli during *Kharif*, 2017.

S. No.	Treatment	Dose (g/ml ha <sup>-1</sup> )	Mean reduction (%) in thrips population, days after spray								
			I <sup>st</sup> spray				II <sup>nd</sup> spray				
			PTP	3 day	7 day	10 day	14 day	3 day	7 day	10 day	14 day
1	Pyriproxyfen 10% EC	750	1.14	65.02 (53.74)	64.65 (53.52)	65.11 (53.80)	60.82 (51.25)	69.84 (56.69)	70.05 (56.82)	66.43 (54.59)	63.96 (53.11)
2	Pyriproxyfen 10% EC	1000	1.22	72.21 (58.18)	69.65 (56.57)	69.20 (56.29)	66.30 (54.52)	74.17 (59.45)	73.66 (59.12)	69.40 (56.41)	67.64 (55.33)
3	Pyriproxyfen 10% EC	1250	1.28	81.32 (64.39)	78.97 (62.71)	75.08 (60.05)	72.52 (58.38)	83.55 (66.07)	78.82 (62.60)	74.13 (59.43)	71.51 (57.74)
4	Imidacloprid 17.8%SL	250	1.14	79.33 (62.96)	76.74 (61.17)	72.28 (58.23)	69.60 (56.54)	80.79 (64.00)	75.91 (60.60)	73.29 (58.88)	69.42 (56.43)
5	Fenpropathrin 30% EC	340	1.17	71.56 (57.77)	69.68 (56.59)	66.76 (54.79)	64.76 (53.59)	73.53 (59.04)	69.50 (56.48)	67.51 (55.25)	64.98 (53.72)
6	Untreated control	-	1.25								
	SEm±			0.826	0.942	1.229	0.641	0.720	0.908	0.613	0.842
	C.D. at 5%			2.546	2.902	3.788	1.974	2.220	2.798	1.889	2.595

PTP = Pre treatment population.

Figures in parenthesis are angular arcsine value

**Table 3:** Efficacy of Pyriproxyfen 10% EC against jassids on chilli during *Kharif*, 2016.

S. No.	Treatment	Dose (g/ml ha <sup>-1</sup> )	Mean reduction (%) in jassids population, days after spray								
			I <sup>st</sup> spray				II <sup>nd</sup> spray				
			PTP	3 day	7 day	10 day	14 day	3 day	7 day	10 day	14 day
1	Pyriproxyfen 10% EC	750	1.30	60.75 (51.21)	60.01 (50.78)	57.46 (49.29)	54.22 (47.42)	65.94 (54.30)	63.82 (53.02)	59.73 (50.61)	53.40 (46.95)
2	Pyriproxyfen 10% EC	1000	1.64	69.26 (56.33)	69.08 (56.22)	64.84 (53.63)	60.38 (50.99)	73.57 (59.06)	72.06 (58.09)	67.66 (55.34)	65.78 (54.20)
3	Pyriproxyfen 10% EC	1250	1.52	73.91 (59.28)	73.55 (59.05)	71.57 (57.78)	68.67 (55.97)	79.76 (63.27)	76.96 (61.32)	75.25 (60.16)	72.91 (58.63)
4	Imidacloprid 17.8%SL	250	1.40	70.57 (57.15)	70.01 (56.80)	68.14 (55.63)	65.67 (54.13)	75.63 (60.42)	74.17 (59.45)	73.29 (58.88)	71.03 (57.44)
5	Fenpropathrin 30% EC	340	1.28	67.13 (55.02)	63.55 (52.86)	62.69 (52.35)	60.90 (51.30)	69.95 (56.76)	68.75 (56.01)	66.10 (54.39)	64.13 (53.21)
6	Untreated control	-	1.44	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	SEm±			0.691	0.875	1.052	0.555	0.656	0.793	0.579	0.736
	C.D. at 5%			2.129	2.697	3.242	1.710	2.022	2.444	1.785	2.266

PTP = Pre treatment population.

Figures in parenthesis are angular arcsine value

**Table 4:** Efficacy of Pyriproxyfen 10% EC against jassids on chilli during *Kharif*, 2017.

S. No.	Treatment	Dose (g/ml ha <sup>-1</sup> )	Mean reduction (%) in jassids population, days after spray								
			I <sup>st</sup> spray				II <sup>nd</sup> spray				
			PTP	3 day	7 day	10 day	14 day	3 day	7 day	10 day	14 day
1	Pyriproxyfen 10% EC	750	1.45	64.91 (53.68)	64.53 (53.45)	65.00 (53.73)	60.71 (51.18)	69.29 (56.34)	68.87 (56.09)	66.39 (54.57)	63.19 (52.65)

2	Pyriproxyfen 10% EC	1000	1.30	72.10 (58.11)	69.54 (56.50)	69.08 (56.22)	66.18 (54.44)	73.62 (59.09)	73.17 (58.80)	68.85 (56.07)	66.54 (54.66)
3	Pyriproxyfen 10% EC	1250	1.40	81.21 (64.31)	78.92 (62.67)	74.95 (59.97)	72.40 (58.30)	83.10 (65.73)	78.27 (62.22)	73.58 (59.07)	71.02 (57.43)
4	Imidacloprid 17.8%SL	250	1.35	79.22 (62.88)	76.63 (61.09)	72.16 (58.16)	69.49 (56.47)	80.23 (63.60)	74.60 (59.73)	72.74 (58.52)	68.93 (56.12)
5	Fenprothrin 30% EC	340	1.42	71.45 (57.70)	69.57 (56.52)	66.65 (54.73)	64.65 (53.52)	72.98 (58.68)	68.94 (56.13)	66.96 (54.91)	64.43 (53.39)
6	Untreated control	-	1.37	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
	SEm±			0.824	1.093	1.226	0.639	0.835	0.891	0.607	0.829
	C.D. at 5%			2.539	3.367	3.777	1.969	2.572	2.745	1.869	2.556

PTP = Pre treatment population.

Figures in parenthesis are angulararcsine value

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