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BIOEFFICACY OF FIPRONIL 200 SC AGAINST THRIPS, *THRIPS TABACI* (LINDERMAN) INFESTING COTTON

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ABSTRACT

Bioefficacy of newer insecticidal molecule was studied against thrips, *Thrips tabaci* (Linnman) infesting cotton. Fipronil 200 SC at 375 ml/ha caused the highest 68.55, 70.63, 64.67; 80.73, 93.65, 88.76 and 64.63, 72.27, 68.19; 80.81, 92.89 and 89.88 percent reduction of thrips followed by Fipronil 200 SC at 300 ml/ha. which caused 51.78, 59.64, 56.67; 75.84, 89.83, 82.41and 46.78, 54.61, 51.65; 75.61, 88.95 and 84.46 percent reduction at 3, 7 and 10 days after first and second spray during 2011 and 2012, respectively.The insecticidal treatment Regent 5% SC at 1500 ml/ha and Imidacloprid 200 SL at 125 ml/ha also recorded lower population of thrips and was significantly superior over other treatments.. The highest seed cotton yield of 29.90 and 30.14 q/ha was recorded in case of Fipronil 200 SC at 375 ml/ha during kharif 2011 and 2012, respectively followed by Fipronil 200 SC at 300, Imidacloprid 200 SL at 125 ml/ha and Regent 5% SC which yielded 29.10, 28.92; 27.48, 27.60; 26.00 and 26.35 q /ha during kharif 2011 and 2012, respectively.

Key words: Cotton, *Thrips tabaci,* fipronil, bioefficacy

Cotton is an important fibre crop and is an important raw material for the Indian textile industry. It plays a key role in the national economy in terms of both employment generation and foreign exchange. The losses in cotton production are due to its susceptibility to about162 species of insect pests and a number of diseases (Manjunath, 2004).

Among the important key pests of cotton the sucking pests *viz.,* leafhopper, *Amrasca biguttula biguttula* (Ishida), aphid, *Aphis gossypii* (Glover), whitefly *Bemisia tabaci* (Gennadius) and thrips, *Thrips tabaci* (Linderman) cause severe damage and serious threat to the crop at early stage of the crop growth and can also affect the crop stand and yield of cotton. Heavy infestation at times reduces the crop yield to the extent of 21.20 per cent (Patil, 1998 and Dhawan and Sidhu, 1986). Therefore chemical control is necessary to keep the population of thrips below ETL.

Cotton growers in India depend heavily on synthetic pesticides to combat sucking pests. Atleast 5–6 sprays are directed against sucking pests. Due to continuous and indiscriminate use of synthetic insecticides, there is resistance and hence the efficacy has become less reliable. The introduction of synthetic pyrethriods, though brought desirable control of bollworms, resulted in resurgence of sucking pests *viz,* aphids, leafhoppers, thrips and whitefly that have also been reported in cotton system due to excessive use of synthetic pyrethriods (Ajri *et al*., 1986, Patil *et al*., 1986).To overcome this problem discovery of novel substances with different biochemical targets are needed. Novel molecules are effective at low doses and have less exposure in the environment. Fipronil belongs to a new class of insecticides fiproles and was found to be efficient compared to pyrethroid, OP and carbomate insecticides (Patil *et al*., 2004). It is important to compare the efficacy of insecticides against pests for effective pest management and to reduce the indiscriminate use of insecticides. Thus, the present study was conducted to evaluate fipronil at different dosages for their efficacy against thrips.

MATERIALS AND METHODS

The bio–efficacy of Fipronil 200 SC @ 225, 300 and 375 ml/ha was evaluated against thrips in cotton during kharif 2011 and 2012.The experiment was conducted in randomized block design with eight treatments replicated three times at R.C.A., Udaipur. Cotton variety KD CHH 621 (BG–II) was sown on 25 June and 19 May during 2011 and 2012 respectively. Each treatment was applied two times at interval of ten days. The observation on the population of thrips was recorded on three top and two middle leaves per plant (5 leaves/plant) on five plants selected randomly. The observation was recorded one day before and at three, seven and ten days after each spray and mean reduction in population was calculated at 3, 7 and 10 days after each sprays. The open bolls were picked from each treatment at regular intervals. The weight of seed cotton of all pickings was pooled together for each

treatment separately and yield per hectare was computed. The effect of Fipronil 200 SC along with other treatments on natural enemies was studied by counting the population of common predatory fauna *viz.;* population of grub and adults of *Coccinella* spp. and *Chrysoperla carnea* at regular interval in each replication.

RESULTS AND DISCUSSION

The data recorded on mean reduction in the population of thrips at 3, 7 and 10 days after first and second spray have been presented in Table 1 and 2. All the treatments were found significantly superior over untreated control. The data reveal that the highest reduction in the population of thrips was recorded in case of spray of Fipronil 200 SC at 375 ml/ha. It was found significantly superior to all treatments. It caused 68.55, 70.63, 64.67; 80.73, 93.65, 88.76 and 64.63, 72.27, 68.19; 80.81, 92.89 and 89.88 percent reduction of thrips at 3, 7 and 10 days after first and second spray during 2011 and 2012, respectively.

It was followed by Fipronil 200 SC at 300 ml/ha. which caused 51.78, 59.64, 56.67; 75.84, 89.83, 82.41and 46.78, 54.61, 51.65; 75.61, 88.95 and 84.46 percent reduction at 3, 7 and 10 days after first and second spray during 2011 and 2012, respectively. It was followed by Regent 5% SC at 1500 ml/ha which caused 54.67, 57.66, 52.43; 72.54, 78.62, 75.92 and 51.26, 59.75, 55.83; 62.50, 72.54 and 74.24 per cent reduction in thrips population at 3, 7 and 10 days after first and second spray during 2011 and 2012, respectively. Fipronil 200 SC at 300 ml/ha was considered as an effective treatment and was found at par to Fipronil 200 SC at 375 ml/ha at 7 day after second spray. Imidacloprid 200 SL at 125 ml/ha caused 75.65 and 70.54; 76.75 and 72.14 per cent reduction in thrips population at 7 and 10 days after second spray and was at par to Regent 5% SC at 1500 ml/ha The remaining treatments were found moderately effective. The data presented in Table 4 revealed that all the treatments yielded significantly higher over untreated control. The seed cotton yield among different treatments ranged from 22.80 to 29.90 and 23.65 to 30.14 q/ha against 20.90 and 20.26 q/ha in untreated control during kharif 2011 and 2012, respectively. The highest seed cotton yield of 29.90 and 30.14 q/ha was recorded in case of spray of Fipronil 200 SC at 375 ml/ha during kharif 2011 and 2012, respectively. It was followed by Fipronil 200 SC at 300, Imidacloprid 200 SL at 125 ml/ha and Regent 5% SC which yielded 29.10, 28.92; 27.48, 27.60; 26.00 and 26.35 q /ha during kharif 2011 and 2012, respectively.

The data recorded on the population of grub and adults of *Coccinella* spp. and *Chrysoperla carnea* revealed that their population did not vary significantly and were at par to each other in different treatments. It

Table 1. Efficacy of Fipronil 200 SC against thrips, *Thrips tabaci* in cotton during *kharif* 2011

S. No.	Treatments	Formulation dose (ml or g/ha)	PTP/plant	Mean reduction (%) in thrips– days after spray					
				First spray			Second spray		
				3 days	7 days	10 days	3 days	7 days	10 days
1	Untreated control		54.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Fipronil 200 SC @ 45	225	56.33	37.00 (36.22)*	39.41 (40.30)	36.72 (35.75)	45.36 (50.62)	49.45 (57.73)	46.37 (52.40)
3	Fipronil 200 SC@60	300	53.67	46.02 (51.78)	50.56 (59.64)	48.83 (56.67)	60.56 (75.84)	71.40 (89.83)	65.20 (82.41)
4	Fipronil 200 SC@75	375	55.00	55.89 (68.55)	57.19 (70.63)	53.53 (64.67)	63.96 (80.73)	75.40 (93.65)	70.41 (88.76)
5	Imidacloprid 200 SL@25	125	58.00	39.56 (40.56)	42.61 (45.84)	40.75 (42.60)	51.64 (61.48)	60.43 (75.65)	57.12 (70.54)
6	Pride 20 WP@10	50	59.67	34.20 (31.59)	37.03 (36.27)	35.83 (34.27)	40.67 (42.46)	44.71 (49.49)	43.56 (47.49)
7	Regent 5 SC@75	1500	60.00	47.68 (54.67)	49.35 (57.66)	46.39 (52.43)	58.40 (72.54)	62.46 (78.62)	60.61 (75.92)
8	Dimethoate 30 EC@200	660	57.67	37.00 (36.21)	41.76 (44.35)	40.25 (41.75)	46.64 (52.85)	51.31 (61.02)	49.34 (57.5)
	S. Em-±		–	0. 69	1.07	1.14	1.19	1.56	1.37
	C.D. at 5%		–	2.10	3.24	3.45	3.60	4.74	4.17

*Figures in parenthesis are retransformed per cent value; PTP: Pre treatment population

Table 2. Efficacy of Fipronil 200 SC against thrips, *Thrips tabaci* in cotton during kharif 2012

S. No.	Treatments	Formulation dose (ml or g/ha)	PTP/plant	Mean reduction (%) in thrips– days after spray					
				First spray			Second spray		
				3 days	7 days	10 days	3 days	7 days	10 days
1	Untreated control		54.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Fipronil 200 SC@45	225	59.33	38.22 (38.27)*	40.58 (42.31)	37.81 (37.59)	45.34 (50.59)	49.52 (57.85)	46.17 (52.04)
3	Fipronil 200 SC@60	300	57.67	43.15 (46.78)	47.65 (54.61)	45.95 (51.65)	60.40 (75.61)	70.58 (88.95)	66.78 (84.46)
4	Fipronil 200 SC@75	375	57.00	53.51 (64.63)	58.22 (72.27)	55.66 (68.19)	64.02 (80.81)	74.54 (92.89)	71.45 (89.88)
5	Imidacloprid 200 SL@25	125	60.00	40.41 (42.02)	43.74 (47.81)	41.93 (44.65)	51.69 (61.56)	61.17 (76.75)	58.10 (72.14)
6	Pride 20 WP@10	50	61.67	36.62 (35.58)	38.25 (38.33)	37.58 (37.20)	40.71 (42.54)	44.72 (49.51)	43.61 (47.57)
7	Regent 5 SC@75	1500	62.33	45.72 (51.26)	50.62 (59.75)	48.35 (55.83)	52.24 (62.50)	58.40 (72.54)	59.50 (74.24)
8	Dimethoate 30 EC@200	660	59.67	39.23 (40.00)	43.30 (47.02)	41.48 (43.86)	46.72 (52.99)	51.38 (61.05)	49.42 (57.69)
	S. Em-±			0.80	1.06	1.12	1.06	1.89	1.41
	C.D. at 5%		–	2.43	3.22	3.38	3.23	5.74	4.28

*Figures in parenthesis are retransformed per cent value

Table 3. Effect of Fipronil 200 SC on natural enemiesand seed cotton yield (2011-2012)

S. No.	Treatments	Formulation dose (ml or g/ha)	Natural enemies/plant (Mean of two years)				Seed cotton Yield (q/ha)	
			Coccinella spp.		*Chrysoperla carnea*			
			Grub	Adult	Grub	Adult	2011	2012
1	Untreated control	–	0.90 (0.27)*	0.93 (0.36)	0.89 (0.30)	0.86 (0.24)	20.90	20.26
2	Fipronil 200 SC@45	225	0.88 (0.28)	0.93 (0.36)	0.90 (0.31)	0.85 (0.22)	24.60	24.15
3	Fipronil 200 SC@60	300	0.86 (0.24)	0.94 (0.38)	0.88 (0.28)	0.85 (0.22)	29.10	28.92
4	Fipronil 200 SC@75	375	0.88 (0.28)	0.92 (0.34)	0.88 (0.28)	0.85 (0.22)	29.90	30.14
5	Imidacloprid 200 SL@25	125	0.87 (0.26)	0.95 (0.40)	0.89 (0.30)	0.86 (0.24)	27.48	27.60
6	Pride 20 WP@10	50	0.88 (0.27)	0.95 (0.40)	0.90 (0.31)	0.87 (0.25)	24.74	25.60
7	Regent 5 SC@75	1500	0.85 (0.22)	0.93 (0.36)	0.88 (0.28)	0.85 (0.22)	26.00	26.35
8	Dimethoate 30 EC@200	660	0.88 (0.28)	0.95 (0.40)	0.90 (0.31)	0.87 (0.25)	22.80	23.65
	S. Em. ±	–	0.006	0.008	0.007	0.007	1.29	1.36
	C.D. at 5%	–	NS	NS	NS	NS	3.92	4.13

*Figures in parenthesis are square root transformed values of population

indicates that sprays of Fipronil 200 SC at 225, 300 and 375 ml/ha and other treatments did not cause significant adverse effects on the common natural enemies present in cotton eco–system (Table 3).

Singh *et al.* (2002) and Sinha *et al*. (2007) reported that Fipronil @ 50 g ai/ha at fortnightly interval was found as the best treatment against the leafhopper. The reports on the bioefficacy of the nicotineoides molecules viz., Imidacloprid, Thiamethoxam and Acetamiprid in spray and seed dressing formulation against sucking pests of cotton and other crops has been well proved (Vastrad, 2003 : Patil *et al*., 2004). Thus the present findings on the efficacy of Fipronil 5% SC @ 800 g/ ha was in confirmity with proven results. These chemicals would be helpful in mitigating sucking pest problem, which are alarming in the present situation and could be included in IPM of either Bt cotton or conventional cotton as a promising component.

The present findings are in line with the findings of Khattak *et al.* (2004) and Saleem and Khan (2001) who reported the efficacy of Confidor 200 SL against sucking pests.

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