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Evaluation of different doses of tolfenpyrad against aphids and thrips in cotton

R. K. KALYAN*, D. P. SAINI, S. RAMESH BABU AND URMILA
Maharana Pratap University of Agriculture and Technology, Agricultural Research Station, Banswara - 327 001
**E-mail: rkkalyan @redifmail. com*

ABSTRACT : Experiments were conducted at Agricultural Research Station, Banswara during *kharif* 2009 and 2010 to evaluate the relative efficacy of different doses of tolfenpyrad 15 EC against aphids and thrips in cotton. There were eight treatments *viz.* tolfenpyrad 15 EC @ 100, 125 150 a.i./ha and 300 a.i./ha (only for phytotoxicity test), imidacloprid 17.8 SL @ 22.5 a.i./ha, acetamiprid 20 SP @ 20g a.i./ha, thiamethoxam 25 WG @ 25 a.i./ha and Control. Significant reduction was recorded in the population of aphids and thrips in all the treatments. Among the treatments, tolfenpyrad, 150 and 125 a.i./ha were found superior over to acetamiprid 20 SP, imidacloprid 17.8 SL and thiamethoxam 25 WG in controlling population of aphids and thrips, and gave significantly higher seed cotton yield than other treatments. Tolfenpyrad 15 EC @ 300 a.i./ha, did not produce any phytotoxicity symptoms on the crop.

Key words: Bioefficacy, tolfenpyrad, sucking pests, cotton

Cotton is an important fibre crop of global significance, provides raw material for the Indian textile industry and plays a key role in the national economy in terms of both employment generation and foreign exchange. Major losses in cotton production are due to its susceptibility to insect pests and a number of diseases (Manjunath, 2004). Sucking pests are quite serious at seedling stage and their heavy infestation reduced the crop yield to a great extent. Among the sap feeders, aphid, *Aphis gossypii* (Glover), thrips, *Thrips* tabaci (Linn.), leaf hoppers, *Amrasca biguttula biguttula* (Ishida), and whitefly, *Bemisia tabaci* (Genn.) are serious pests. The estimated loss due to sucking pests in tune of 21.20 to 22.86 per cent (Satpute *et al.,* 1990). In India cotton growers depend mainly on synthetic insecticides to combat sucking pests. At least 3-5 sprays were directed against sucking pests. Continuous and indiscriminate use of synthetic insecticides resulted in resistance development to these insecticides which reflected on the reliability of efficacy of these insecticides. To overcome this problem testing of new molecules are needed for obtaining effective control of pests.

Tolfenpyrad is a broad spectrum insecticide and has not exhibited cross resistance with current products. It acts mainly through inhibition of respiration of target pests with very rapid insecticidal responses, including cessation of movement and feeding, lack of fecundity and eventual death of pest. Therefore field efficacy of tolfenpyrad was carried out against sucking pests of cotton.

MATERIALS AND METHODS

The experiments were conducted at Borwat Farm, Agricultural Research Station, Banswara during *kharif,* 2009 and 2010 to evaluate the efficacy of different doses of tolfenpyrad 15 EC alongwith other molecules. The trial was laid out in randomized block design (RBD) with 3 replications and 8 treatments (Table 1). The cotton variety H 8 was sown in row to row and plant to plant distance of 90 ×45 cm in 6 m row length. All the recommended agronomic practices were followed as per the package of practices to raise the crop except insecticidal sprays. Observations on pest incidence were recorded

Table 1. Details of treatments and their dosage

Insecticides (dose/ha)	(ml/g)
T_1	667 ml
T_2	833 ml
T_3	1000 ml
T_4	126 ml
T_5	100 g
T_6	100 g
T_7	-

* For phytotoxicity studies only

from 5 fixed plants/plot which were tagged after selecting randomly for this purpose. The number of sucking pests namely, aphid, *Aphis gossypii* (Glover) and thrips *Thrips tabaci* (Linn) were recorded (both nymphs as well as adults) from 3 leaves/plant, before spray, 3rd and 7th days after spray and were converted into square root for statistical analyzed for analysis of variance. The seed cotton yield was recorded at harvest plotwise and worked out as kg/ha.

RESULTS AND DISCUSSION

Efficacy of molecules against aphids, *Aphis gossypii:* Pre treatment population of aphids was uniform and no significant differences were observed among the treatments (23.40 to 26.60/3 leaves). All the tested molecules significantly reduce the aphid population as compared to untreated check and standard check at 3rd and 7th day after spray (Table 2). At 3 day after spray, the lowest population of aphids (12.20 /3 leaves) was recorded in tolfenpyrad 15 EC @ 150 a.i./ha, was *at par* with tolfenpyrad @ 125 a.i./ha which was followed by imidacloprid 17.8 SL, tolfenpyrad @ 100 a.i./ha, acetamiprid 20 SP and thiamethoxam 25 WG. All the doses of tolfenpyrad (@ 100, 125 and 150 a.i./ha) were statistically *at par* in controlling aphid population after 7 days of spray during 2009 (Table 2).

During 2010, the population of aphids did not vary significantly in all the plots before spray (28.40 to 31.73/3 leaves). All the treatments were found significantly superior over control after spray at 3rd and 7th days after spray (Table 2). At 3 day after spray, the lowest population of aphids (11.27 /3 leaves) was recorded in tolfenpyrad 15 EC @ 150 a.i./ha which was *at par* with tolfenpyrad @ 125 a.i./ha (12.33 /3 leaves) and it was followed by imidacloprid, thiamethoxam and tofenpyrad (100 a.i./ha). These treatments were *at par* with each other. After 7 day spray, tolfenpyrad @150 and 125 a.i./ha were statistically *at par*. The next best treatment was thiamethoxam, which was *at par* with imidacloprid, tolfenpyrad (100 a.i./ha) and acetamiprid.

Efficacy of molecules against thrips, *Thrips tabaci :* In case of thrips, the population was quite uniform prior to the application of insecticides (8.97 to 11.73/3 leaves) during the year 2009. Significant reduction in population of thrips was recorded in all treatments at 3rd and 7th days after sprays (Table 3). At 3 day after spray, the lowest population of thrips (3.60 /3 leaves) was recorded in treatment tolfenpyrad 15 EC @ 150 and it was *at par* with tolfenpyrad 15 EC @125 a.i/ha (3.80 /3 leaves). Imidacloprid, tolfenpyrad, acetamiprid and thiamethoxam, were the next best treatments and were statistically *at par* with each other during 2009. After 7 day of spray, tolfenpyrad at 150 and 125 a.i./ha were *at par* and followed by tolfenpyrad (100 a.i./ha), imidacloprid, acetamiprid and thiamethoxam which were statistically *at par* with each other during 2009.

During 2010, before spray the

Table 3. Effect of different doses of tolfenpyrad and other insecticides on population of aphids during 2009 and 2010

Treatments	Number of aphids/3 leaves					
	2009			2010		
	BS	3 DAS	7 DAS	BS	3 DAS	7 DAS
T_1	23.40(4.83)*	16.07(4.01)	7.33(2.68)	29.80(5.46)	15.13(3.89)	8.40(2.89)
T_2	26.20(5.12)	13.13(3.62)	7.10(2.66)	31.43(5.61)	12.33(3.51)	6.27(2.49)
T_3	26.16(5.11)	12.20(3.49)	6.20(2.48)	30.60(5.53)	11.27(3.35)	5.47(2.34)
T_4	24.30(4.93)	15.47(3.93)	8.40(2.89)	30.00(5.48)	14.40(3.79)	8.20(2.86)
T_5	25.40(5.04)	16.80(4.10)	10.60(3.25)	31.73(5.63)	17.23(4.15)	9.30(3.04)
T_6	24.40(4.94)	16.80(4.10)	12.00(3.46)	28.40(5.33)	14.80(3.85)	7.73(2.78)\
T_7 **Control**	26.60(5.15)	30.37(5.51)	35.57(5.96)	30.63(5.53)	35.53(5.96)	41.00(6.40)
F test	NS	S	S	NS	S	S
P=0.05	-	(0.32)	(0.36)	-	(0.26)	(0.33)

BS= before spray, DAS= days after spray, NS – non significant, S- significant, * Figures in parenthesis are square root transformations.

Table 4. Effect of different doses of tolfenpyrad and other insecticides on population of thrips during 2009 and 2010

Treatments	Number of aphids/three leaves					
	2009			2010		
	BS	3 DAS	7 DAS	BS	3 DAS	7 DAS
T_1	8.97(2.99)*	4.87(2.20)	4.20(2.05)	12.40(3.51)	3.60(1.89)	2.40(1.55)
T_2	10.40(3.22)	3.80(1.95)	2.60(1.61)	12.60(3.54)	3.00(1.73)	2.00(1.41)
T_3	11.27(3.66)	3.60(1.90)	2.00(1.41)	12.20(3.49)	2.40(1.55)	1.80(1.33)
T_4	9.30(3.05)	4.80(2.19)	4.20(2.05)	11.20(3.35)	4.00(1.99)	3.00(1.69)\
T_5	10.60(3.25)	5.27(2.29)	4.60(2.14)	12.40(3.52)	3.20(1.79)	2.20(1.48)
T_6	9.40(3.06)	5.47(2.33)	4.80(2.19)	11.40(3.37)	4.97(2.23)	3.80(1.94)
T_7 Control	11.73(3.42)	12.60(3.55)	15.73(3.96)	11.00(3.31)	13.60(3.69)	15.20(3.90)
F test	NS	S	S	NS	S	S
P=0.05	-	(0.21)	(0.22)	-	(0.23)	(0.35)

BS= before spray, DAS= days after spray, NS – non significant, S- significant, * Figures in parenthesis are square root transformations.

population of thrips was uniform and non significant with the range of 11.0 to 12.60 thrips/3 leaves. All the tested molecules significantly reduced the thrips population in comparison to untreated check and standard check at 3rd and 7th days after sprays. At 3 day after spray, the lowest population of thrips (2.40/3 leaves) was recorded in treatment tolfenpyrad 15 EC @ 150 and it was *at par* with tolfenpyrad 15 EC @125 a.i/ha (3.00 /3 leaves). Acetamiprid and tolfenpyrad (100 a.i./ha) were the next best treatments which were statistically *at par* with tolfenpyrad 15 EC @125 a.i/ha. Same trend was observed in controlling the thrips population after 7 days of spray.

The present findings are in line with the findings of Bajpai and Singh (2010) who reported tolfenpyrad 15 EC @ 150 a.i./ha was very effective against sucking pests of okra. The present findings are also in conformity with the findings of Saini *et al.,* (2010)

Phytotoxicity of tolfenpyrad on cotton : On the basis of data presented on different aspects of phytotoxicity in cotton it clearly showed that tolfenpyrad 15 EC @ 300 a.i./ha did not produce any type of phytotoxicity in cotton crop.

Seed cotton yield (kg/ha) : It is evident from mean data of two years given in Table 6 the highest seed cotton yield (1521.0 kg/ha) was recorded in tolfenpyrad 15 EC @ 150 a.i./ha with maximum avoidable losses (52.00%),

Table 4. Effect of different doses of tolfenpyrad and other insecticides on seed cotton yield (kg/ha) during 2009 and 2010

	Seed cotton yield(kg/ha)			Avoidable yield losses (%)
	2009	2010	**Mean**	
T_1	1140	1029	**1084.5**	32.68
T_2	1437	1358	**1397.5**	47.76
T_3	1509	1533	**1521.0**	52.00
T_4	1109	1214	**1161.5**	37.15
T_5	1191	1008	**1099.5**	33.60
T_6	1078	905	**991.5**	26.37
T_7	647	813	**730.0**	-
F test		S	**S**	
P=0.05		263	**258**	

and was followed by tolfenpyrad 15 EC @ 125 a.i. (1397.5 kg/ha), imidacloprid @ 20 a.i./ha (1161.5 kg/ha) and acetamprid 20 per cent SP@ 20 a.i.(1099.5 kg/ha) over to control (730.0 kg/ha).

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