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Evaluation of different insecticides at different days after crossing ETL of moth trap catches on incidence of pink bollworm *Pectinophora gossypiella* on Bt cotton

DU Gosavi, BV Bhede and SS Ajabe

Abstract
The field experiment was conducted in *Kharif* season of 2018 at Department of Agricultural Entomology, V.N.M.K.V. Parbhani (M.S.), India to evaluate different insecticides on different days after pheromone trap (gossyplure) catches (after crossing ETL of 8 moths/ trap/ night.) for the management of pink bollworm on Bt cotton. The experiment was laid out in Split plot Design with three replications. The results revealed that the proper period for spraying was 2nd (T_1) and (T_2) 6th day after crossing ETL of moths trapped in pheromone traps. It was followed by 10th (T_3) and 14th (T_4) day after crossing ETL. The most effective insecticide against pink bollworm was lambda-cyhalothrin 5 EC and followed by profenofos 40 + cypermethrin 4 EC, profenofos 50 EC and chlorantraniliprole 18.5 SC. The interaction results indicated that spraying of lamda-cyhalothrin 5 EC on 2nd and 6th day after crossing ETL of moth trap catches in pheromone trap showed most effective management of pink bollworm on Bt cotton.

Keywords: Pink bollworm (*Pectinophora gossypiella*), pheromone trap catches, insecticides

Introduction
The pink bollworm (PBW), *Pectinophora gossypiella* (Saunders) (Lepidoptera: Gelechiidae) is one of the most important pests of cotton world-wide (Anon, 1996) [1]. The pink bollworm is back with a retribution. It is reported that the survival of pink bollworm larvae in BG-II to be significantly higher during 2012, 2013 and 2014, mainly in Amreli and Bhavnagar districts in Saurashtra, Gujarat (Kranthi, 2015) [6]. Dhurua and Gujar [2] (2011) reported that resistance to Cry1Ac had developed by 2008 in a population sampled from non-Bt cotton in the Amreli district of Gujarat in western India. The pink bollworm is back with a great exacerbation. Severe damage to bolls by pink bollworm and yield-losses were observed in Bt-cotton in many regions of Gujarat, Andhra Pradesh, Telangana and Maharashtra. Pink bollworm is an internal feeder and spent very less time out of boll after hatching eggs hence it is difficult to notice its incidence and to manage it. In the detection and control of *P. gossypiella* synthetic pheromones have been employed extensively (Gao e*t al.*, 1992) [3]. In early-season use of pheromone coupled with insecticides applied at low thresholds is generally most profitable, especially at low pink bollworm population densities. Hence the present studies were conducted to evaluate different insecticides on different days after pheromone trap (gossyplure) catches (after crossing ETL of 8 moths/ trap/ night.) for the management of pink bollworm on Bt cotton.

Materials and Methods
The experiment was conducted at Department of Agricultural Entomology, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (M.S., India) during Kharif 2018-19. Bt cotton was sown in the net plot size 4.8 m x 4.2 m at 120 cm x 45 cm spacing. The experiment was laid out using spilt plot design with three replications. The main plots were days after crossing ETL of moth trap catches in pheromone trap (T_1, T_2, T_3, T_4) and sub plots were insecticides (B_1, B_2, B_3, B_4, B_5). Two sprayings were given of insecticides Azadirachtin 3000 ppm @ 2500 ml / ha (B_1), Profenofos 50 EC @ 1000 ml / ha (B_2), Lambda-cyhalothrin 5 EC @ 300 ml / ha (B_3), Chlorantraniliprole 18.5 SC @ 150 ml / ha (B_4), Profenofos 40 + Cypermethrin 4 EC @ 1000 ml / ha (B_5). The first spraying was given on 2nd, 6th, 10th and 14th day after the pheromone trap catches crossed ETL of 8 moths/

trap/ night and second spraying after 30 days of first spraying. The spraying was done with battery operated knapsack sprayer. Before initiation of treatments the sucking pests were controlled by spraying buprofezin 25 SC.

The observations on rosette flowers (75 and 90 DAS), green boll damage (90, 105, 120, 135 and 150 DAS), open boll damage (120 and 150 DAS), locule damage (after harvesting) and yield were recorded. The percentage damage was subjected to angular transformations. The transformed data was subjected to ANOVA using OPSTAT software package and result were interpreted.

Results and Discussion

Rosette flowers

75 days after sowing: The results indicated (Table 1) that there were significant differences among insecticides and period of spraying. The interaction effect was also significant. At 75 DAS T_1 (2 days after crossing ETL) plots were sprayed with different insecticides and the remaining plots were sprayed after 75 DAS. Hence only T_1 recorded significantly lowest rosette flowers (0.68 per cent). T_2, T_3 and T_4 were at par with each other recording 4.96, 4.95 and 4.96 per cent, respectively.

Among insecticides the lowest rosette flowers recorded in plots treated with lambda-cyhalothrin 5 EC (3.66 per cent). However, it was at par with profenofos 50 EC, profenofos 40 + cypermethrin 4 EC and chlorantraniliprole 18.5 SC. The plots sprayed with Azadirachtin 3000 ppm recorded significantly highest rosette flowers (4.30 per cent).

The results revealed that when lambda-cyhalothrin 5 EC was sprayed on 2nd day after crossing ETL, the rosette flowers were lowest at 75 DAS.

90 days after sowing: At 90 DAS, the first spraying was applied in all plots. The data indicated that period of insecticides spraying and different insecticides showed significant differences. The interaction was also significant. The rosette flowers during different period of insecticides application ranged from 2.04 to 3.04 per cent. T_1 recorded lowest rosette flowers which were at par with T_2 treatment. T_4 recorded highest rosette flowers which were at par with T_3.

Among the insecticides, lambda-cyhalothrin 5 EC recorded lowest rosette flowers (1.58 per cent) and it was at par with profenofos 40 + cypermethrin 4 EC. These were followed by profenofos 50 EC and chlorantraniliprole 18.5 SC. The rosette flowers were significantly highest in Azadirachtin 3000 ppm (4.60 per cent).

The interaction showed that the rosette flowers were minimum when lambda cyhalothrin 5 EC (0.83 per cent) and profenofos 40 + cypermethrin 4 EC (0.97 per cent) were sprayed after 2 days crossing ETL (Table 1).

Green boll damage

90 days after sowing: Up to 90 DAS, all plots were treated with different insecticides at different period after crossing ETL. There were non-significant differences among period of insecticides application. The green boll damage ranged from 3.33 to 6.33 per cent. (Table 1)

Among insecticides, the lowest green boll damage was noticed in lambda- cyhalothrin 5 EC (1.67 per cent) which was at par with profenofos 50 EC and profenofos 40 + cypermethrin 4 EC. The highest green boll damage was recorded in Azadirachtin 3000 ppm (7.92 per cent). The interaction was non-significant.

105 days after sowing: On 105 DAS, second spraying of insecticides was given only in T_1 treatment (2 days after crossing ETL). The second spraying was given after 105 DAS in all other plots at different days. The results showed that there were significant differences among different period of insecticide application and different insecticides. However, the interaction was not significant. The treatment T_1 and T_2 recorded lowest green boll damage (7.33 per cent). The green boll damage was highest in T_4 (12.00 per cent) and at par with T_3 (9.67 per cent). Among insecticides, the green boll damage was significantly lowest in lambda-cyhalothrin 5 EC (4.58 per cent) except profenofos 40 + cypermethrin 4 EC (5.83 per cent). The next effective insecticides were profenofos 50 EC and chlorantraniliprole 18.5 SC which were at par with each other. The Azadirachtin 3000 ppm recorded significantly highest green boll damage (17.92 per cent).

120 days after sowing: Up to 120 DAS, the second spraying of insecticides was given to all plots. The data indicated (Table 1) that the lowest green boll damage was noticed when insecticides sprayed with T_1 – 2 days after crossing ETL (19.33 per cent) which was at par with T_2 (20.99 per cent). The treatment T_4 recorded significantly highest green boll damage (26.00 per cent).

Among insecticides, the plots treated with NSE recorded significantly maximum green boll damage (36.40 per cent). The green boll damage was significantly lowest in lambda-cyhalothrin 5 EC (15.83 per cent). The next effective treatments were profenofos 40 + cypermethrin 4 EC, profenofos 50 EC and chlorantraniliprole 18.5 SC.

The interaction showed non-significant differences. However, the green boll damage was less when lambda-cyhalothrin 5 EC sprayed at 2 and 6 days after crossing ETL (10.00 and 13.33 per cent, respectively).

135 days after sowing: The data revealed (Table 1) that the period of insecticides application and different insecticides showed significant impact on green boll damage due to pink bollworm on 135 DAS. However, there were not significant differences in interaction. The lowest green boll damage registered when insecticides applied at T2– 6 days after crossing ETL which was at par with T1-2 days after crossing ETL. The highest green boll damage was observed at T4 - 14 days after crossing ETL and at par with T3 -10 days after crossing ETL.

The green boll damage was significantly highest in NSE (59.58 per cent). The green boll damage was significantly lowest in lambda-cyhalothrin 5 EC (33.75 per cent). The next effective insecticides were profenofos 40 + cypermethrin 4 EC, profenofos 50 EC and chlorantraniliprole 18.5 SC.

The interaction results showed that when lambda-cyhalothrin was applied on 2 days after crossing ETL, the green boll damage was less (28.33 per cent).

150 days after sowing: The data (Table 1) at 150 DAS indicated that the treatment T_2 recorded minimum green boll damage (75.00 per cent) and at par with T_1 (76.67 per cent). The treatment T_4 observed highest green boll damage which was at par with T_3.

Among the insecticides, lambda-cyhalothrin 5 EC registered significantly lowest green boll damage (71.67 per cent). It was followed by profenofos 40 + cypermethrin 4 EC, profenofos 50 EC and chlorantraniliprole 18.5 SC.

The interaction results indicated that when lambda-

cyhalothrin 5 EC sprayed on 6 days after crossing ETL registered lowest green boll damage (61.67 per cent).

Open boll damage

120 days after sowing: Among the time of insecticides application, the treatment T_1 (02 days after crossing ETL) recorded lowest open boll damage (11.05 per cent) and at par with T_2 (06 days after crossing ETL) (12.78 per cent). The highest open boll damage was recorded when insecticides sprayed on 14 days after crossing ETL (T_4) which was at par with T_3 (Table 1).

The plots treated with Azadirachtin 3000 ppm recorded significantly highest open boll damage (25.07 per cent). The minimum open boll damage was registered in lambda-cyhalothrin 5 EC (7.79 per cent) which was at par with profenofos 40 + cypermethrin 4 EC. The next effective insecticides were profenofos 50 EC and chlorantraniliprole 18.5 SC.

The interaction was non-significant. However, the lowest open boll damage was noticed when lambda-cyhalothrin 5 EC was sprayed on 2 days after crossing ETL.

150 days after sowing: The data indicated (Table 1) that there were significant differences among different period of applications and different insecticides. However, the interaction effect was non-significant. The lowest open boll damage was noticed in T_2 (38.05 per cent)

which was at par with T_1 (40.64 per cent). The highest damage was observed in T_4 (52.02 per cent) and at par with T_3 (47.31 per cent).

Among insecticides, the plots treated with lambda-cyhalothrin 5 EC recorded lowest open boll damage and it was followed by profenofos 40 + cypermethrin 4 EC which were at par with each other. The next best insecticides were profenofos 50 EC and chlorantraniliprole 18.5 SC. The open boll damage was significantly highest in Azadirachtin 3000 ppm.

The interaction showed that when lambda-cyhalothrin 5 EC was sprayed on 6 days after crossing ETL, the open boll damage was minimum (28.23 per cent).

Locule damage: The locule damage was significantly lowest when insecticides were applied on 06 days after crossing ETL (T_2). It was followed by T_1 and T_3. The treatment T_4 recorded highest locule damage (36.41 per cent).

Among the insecticides, Azadirachtin 3000 ppm recorded significantly highest locule damage (38.14 per cent). It was significantly lowest in lambda-cyhalothrin 5EC. The next effective treatments were profenofos 40 + cypermethrin 4 EC, profenofos 50 EC and chlorantraniliprole 18.5 SC.

The results of interaction revealed that the locule damage was lowest when lambda-cyhalothrin5 EC was applied on 02 days after crossing ETL (Table 1).

Seed cotton yield

First Picking: The data (Table 1) on first picking of seed cotton indicated that the maximum seed cotton yield was recorded when insecticides were applied on 6 days after crossing ETL (6.05 q/ha) which was at par with T_1 (02 days after crossing ETL) (5.71 q/ha). The lowest yield was observed when insecticides sprayed 14 days after crossing ETL (4.77 q/ha) and at par with T_3 (10 days after crossing ETL) (5.11 q/ha).

The highest seed cotton yield was recorded in plots treated with lambda-cyhalothrin 5 EC (6.04 q/ha) and followed by profenofos 40 + cypermethrin 4 EC which were at par with each other. The next effective insecticides were profenofos 50 EC and chlorantraniliprole 18.5 SC. The treatment Azadirachtin 3000 ppm recorded significantly lowest seed cotton yield (4.26 q/ha).

The interaction was non-significant. However, when lambda-cyhalothrin 5 EC was sprayed on 6 days after crossing ETL, the seed cotton yield was maximum (6.70 q/ha).

Second picking: The observations indicated (Table 1) that the treatment T_2 (06 days after crossing ETL) recorded significantly highest seed cotton yield (5.11q/ha). It was followed by T_1 (02 days after crossing ETL) (4.89 q/ha). The yield was significantly lowest in T_4 (14 days after crossing ETL) (4.45q/ha).

Among insecticides, lambda-cyhalothrin 5 EC recorded highest seed cotton yield which was at par with profenofos 40 + cypermethrin 4 EC. The next better insecticides were profenofos 50 EC and chlorantraniliprole 18.5 SC. The Azadirachtin 3000 ppm recorded significantly lowest yield.

The interaction result showed that the seed cotton yield was highest when lambda-cyhalothrin 5 EC sprayed on 06 days after crossing ETL.

Total seed cotton yield: There were significant differences among period of application and various insecticides. The interaction was not significant. Among different periods of insecticides application, the yield was significantly highest when applied on 06 days after crossing ETL (11.15 q/ha). It was followed T_1 (10.60 q/ ha) and T_3 (9.79 q/ha). The yield was significantly lowest in T_4 (9.21 q/ha).

The seed cotton yield was significantly highest in lambda-cyhalothrin 5 EC treated plots (11.43 q/ha) except profenofos 40 + cypermethrin 4 EC (11.18 q/ha) which were at par with each other. These were followed by profenofos 50 EC and chlorantraniliprole 18.5 SC. The yield was significantly lowest in Azadirachtin 3000 ppm (7.49 q/ha).

The interaction showed that the seed cotton yield was highest (12.63 q/ha.) when lambda-cyhalothrin 5 EC was sprayed on 06 days after crossing ETL (Table 1).

The literature on effect of different insecticides at different time of application is scanty. However, literature on the efficacy of different insecticides against pink bollworm is available. The present studies were discussed in accordance with available literature. Ghure *et al.*, (2008) [4] reported that lambda-cyhalothrin 5 EC, indoxacarb 14.5 SC, spinosad 45 SC and profenofos 50 EC were found highly effective against cotton bollworms. Mourad *et al*., (1991) [7] reported that Karate (lambda-cyhalothrin) was the most effective pyrethroid and Fenval (fenvelarate) the least effective. The organophosphate insecticides, Bolster (sulprofos) and the carbamate, Ravion (carbaryl) were less effective than the pyrethroids. Imran *et al.*, (2017) [5] reported that polytrin C (Profenofos 40 + Cypermethrin 4 EC) was effective on larvae of PBW in both Bt. and non-Bt. varieties.

Table 1: Effect of different insecticides at different days after crossing ETL of moth trap catches on incidence of pink bollworm and yield of *Bt* cotton

Treatment	Rosette flowers (%)		Green boll damage (%)					Open boll damage (%)		Locule damage (%)	Yield q/ha		
	75 DAS	90 DAS	90 DAS	105 DAS	120 DAS	135 DAS	150 DAS	120 DAS	150 DAS		Ist picking	IInd picking	Total
T1I1	2.17 (8.38)*	5.30 (13.25)	6.67 (14.75)*	13.33 (21..33)	28.33 (32.13)	56.67 (48.85)	85.00 (67.38)	18.57 (25.50)*	55.79 (48.40)	34.53 (35.95)	4.43	3.90	8.33
T1I2	0.47 (3.12)	1.50 (6.94)	3.33 (8.61)	6.67 (14.75)	20.00 (26.44)	38.33 (38.18)	78.33 (62.45)	11.77 (20.03)	40.03 (39.22)	27.07 (31.32)	5.60	5.13	10.73
T1I3	0.07 (0.85)	0.83 (5.22)	0.00 (0.00)	3.33 (8.61)	10.00 (18.04)	30.00 (33.15)	70.00 (56.97)	4.33 (11.97)	31.80 (34.30)	22.39 (28.19)	6.50	5.47	11.97
T1I4	0.60 (4.33)	1.60 (7.23)	5.00 (10.45)	8.33 (16.59)	23.33 (28.84)	40.00 (39.13)	81.67 (64.97)	13.63 (21.65)	41.03 (39.36)	27.82 (31.81)	5.77	4.58	10.35
T1I5	0.10 (1.05)	0.97 (5.66)	1.67 (4.31)	5.00 (12.92)	15.00 (22.78)	35.00 (36.17)	76.67 (61.12)	6.94 (14.98)	34.57 (35.83)	25.20 (30.10)	6.27	5.37	11.63
T2I1	4.83 (12.69)	3.40 (10.59)	6.67 (12.28)	16.67 (24.04)	30.00 (33.15)	48.33 (44.03)	78.33 (62.45)	21.00 (27.08)	50.05 (45.05)	29.70 (32.95)	4.73	4.18	8.92
T2I2	4.56 (12.31)	2.27 (8.60)	5.00 (10.45)	6.67 (14.75)	20.00 (26.55)	35.00 (36.22)	76.67 (61.19)	13.32 (21.36)	37.53 (37.76)	23.87 (29.20)	6.25	4.95	11.20
T2I3	5.03 (12.93)	1.57 (7.17)	1.67 (4.30)	3.33 (8.61)	13.33 (20.75)	28.33 (32.00)	61.67 (51.73)	6.55 (14.76)	28.23 (32.05)	18.92 (25.75)	6.70	5.93	12.63
T2I4	4.77 (12.53)	2.43 (8.92)	6.67 (14.75)	6.67 (14.75)	23.33 (28.84)	41.67 (40.18)	85.00 (67.68)	14.40 (22.25)	43.06 (40.91)	25.60 (30.35)	6.03	4.79	10.83
T2I5	5.60 (13.67)	1.93 (7.97)	3.33 (8.61)	3.33 (8.61)	18.33 (25.18)	33.33 (34.91)	73.33 (58.91)	8.63 (17.04)	31.40 (33.93)	20.67 (27.01)	6.52	5.68	12.20
T3I1	5.13 (13.01)	4.67 (12.38)	8.33 (16.59)	20.00 (26.44)	40.00 (39.19)	61.67 (51.79)	90.00 (71.92)	27.93 (31.76)	66.40 (54.57)	41.90 (40.32)	4.03	3.45	7.48
T3I2	5.17 (13.08)	2.87 (9.73)	5.00 (12.92)	10.00 (18.04)	21.67 (27.70)	48.33 (44.02)	83.33 (66.12)	15.48 (23.11)	45.37 (42.32)	28.90 (32.50)	5.15	5.10	10.25
T3I3	4.55 (12.30)	1.83 (7.76)	1.67 (4.30)	5.00 (12.92)	18.33 (25.29)	36.67 (37.19)	73.33 (59.03)	9.53 (17.95)	36.23 (36.97)	27.43 (31.54)	5.82	5.30	11.12
T3I4	5.33 (13.34)	3.03 (10.00)	6.67 (14.75)	8.33 (16.59)	23.33 (28.77)	51.67 (45.95)	86.67 (68.82)	16.53 (23.71)	50.55 (45.30)	31.40 (34.06)	4.97	4.45	9.42
T3I5	4.57 (12.20)	2.03 (8.17)	3.33 (8.61)	5.00 (12.92)	25.00 (29.91)	41.67 (40.15)	81.67 (64.67)	11.03 (19.28)	38.00 (38.01)	29.90 (33.13)	5.57	5.13	10.70
T4I1	5.07 (12.99)	5.03 (12.95)	10.00 (18.04)	21.67 (27.70)	43.33 (41.15)	71.67 (57.96)	91.67 (73.76)	32.80 (34.86)	73.13 (58.88)	47.17 (43.35)	3.83	3.21	7.04
T4I2	4.77 (12.55)	2.93 (9.86)	6.67 (14.75)	10.00 (18.04)	30.00 (33.15)	56.67 (48.85)	90.00 (71.54)	18.50 (25.30)	48.60 (44.17)	34.47 (35.91)	4.83	4.88	9.72
T4I3	5.00 (12.82)	2.07 (8.23)	3.33 (8.61)	6.67 (14.75)	21.67 (27.58)	40.00 (39.19)	81.67 (64.67)	10.75 (18.89)	41.67 (40.17)	30.77 (33.67)	5.13	4.87	10.00
T4I4	4.77 (12.55)	3.10 (10.14)	6.67 (14.75)	11.67 (19.88)	25.00 (29.91)	61.67 (51.82)	86.67 (68.82)	21.00 (27.23)	52.27 (46.28)	35.93 (36.81)	4.73	4.38	9.12
T4I5	5.17 (13.10)	2.07 (8.23)	5.00 (10.45)	10.00 (18.04)	30.00 (33.15)	46.67 (43.06)	88.33 (70.67)	12.70 (20.60)	44.45 (41.77)	33.73 (35.48)	5.30	4.88	10.18
Main plot (Trap catches)													
T_1	0.68 (3.54)	2.04 (7.65)	3.33 (8.12)	7.33 (14.84)	19.33 (25.65)	40.00 (39.09)	77.33 (62.58)	11.05 (18.83)	40.64 (39.42)	27.40 (31.47)	5.71	4.89	10.60
T_2	4.96 (12.83)	2.32 (8.65)	4.67 (10.08)	7.33 (14.15)	20.99 (26.89)	37.33 (37.47)	75.00 (60.39)	12.78 (20.50)	38.05 (37.94)	23.75 (29.05)	6.05	5.11	11.15
T_3	4.95 (12.78)	2.89 (9.61)	5.00 (11.43)	9.67 (17.38)	25.67 (30.17)	48.00 (43.82)	83.00 (66.11)	16.10 (23.16)	47.31 (43.43)	31.91 (34.31)	5.11	4.69	9.79
T_4	4.96 (12.80)	3.04 (9.88)	6.33 (13.32)	12.00 (19.76)	26.00 (32.99)	55.34 (48.18)	87.67 (69.89)	19.15 (25.37)	52.02 (46.25)	36.41 (37.04)	4.77	4.45	9.21
SE ±	0.31	0.24	2.49	1.03	0.66	1.61	0.93	0.59	1.05	0.23	0.10	0.05	0.08
CD at 5%	1.10	0.83	NS	3.63	2.34	5.69	3.29	2.08	3.69	0.83	0.34	0.17	0.28
Sub plot (Insecticide)													
I_1	4.30 (11.77)	4.60 (12.29)	7.92 (15.42)	17.92 (24.88)	35.42 (36.40)	59.58 (50.65)	86.25 (68.88)	25.07 (29.80)	61.36 (51.72)	38.14 (38.14)	4.26	3.69	7.94
I_2	3.74 (10.26)	2.39 (8.78)	5.00 (11.68)	8.34 (16.40)	22.92 (28.46)	44.58 (41.81)	82.08 (65.33)	14.77 (22.45)	42.88 (40.87)	28.60 (32.23)	5.46	5.02	10.48
I_3	3.66 (9.72)	1.58 (7.09)	1.67 (4.30)	4.58 (11.22)	15.83 (22.92)	33.75 (35.38)	71.67 (58.10)	7.79 (15.86)	34.48 (35.87)	24.88 (29.79)	6.04	5.39	11.43
I_4	3.87 (10.96)	2.54 (9.07)	6.25 (14.29)	8.75 (16.95)	23.74 (29.09)	48.75 (44.27)	85.00 (67.58)	16.39 (23.71)	46.72 (42.96)	30.19 (33.26)	5.38	4.55	9.93

I_5	3.86 (10.01)	1.75 (7.49)	3.33 (7.99)	5.83 (13.22)	22.08 (27.75)	39.17 (38.57)	80.00 (63.84)	9.82 (17.98)	37.10 (37.38)	27.37 (31.43)	5.91	5.27	11.18
SE ±	0.46	0.28	1.50	1.05	0.99	1.23	1.20	0.94	1.26	0.56	0.10	0.07	0.13
CD at 5%	1.32	0.82	4.34	3.05	2.89	3.57	3.48	2.71	3.65	1.61	0.30	0.21	0.39
Interaction (Main X Sub)													
SE ±	0.87	0.56	5.57	2.15	1.49	2.73	2.34	1.78	2.49	1.02	0.21	0.14	0.25
CD at 5%	2.60	1.68	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

*Figures in parentheses are Angular transformed values.

Conclusion

In the present studies, lamada-cyhalothrin 5 EC was most effective against pink bollworm at different periods of insecticide application after crossing ETL of moths trapped in pheromone traps. It was followed by profenofos 40 + cypermethrin 4 EC, profenofos 50 EC, Chlorantraniliprole 18.5 SC and Azadirachtin 3000 ppm and the proper period for spraying was 2 and 6 days after crossing ETL of moths trapped in pheromone traps. It was followed by 10 and 14 days after crossing ETL. The results are mostly in the line of above research workers.

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