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Efficacy of newer insecticides against sucking pests of hybrid cotton in the western undulating zone of Odisha

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Abstract
The field experiment was conducted during *Kharif*, 2014-15 and 2015-16 in the research field of the All India Coordinated Research Project on Cotton at the Regional Research and Technology Transfer Station (OUAT), Bhawanipatna situated in the Western Undulating Agro-climatic Zone of Odisha to study the field efficacy of newer insecticides against sucking pests of hybrid cotton. The trial was laid out in randomized block design with three replications taking DCH 32 as the test hybrid with eight treatments *viz.*T_1: Buprofezin 25%SC @ 250 g a.i/ha, T_2: Flonicamid 50% WG @ 75 g a.i/ha, T_3: Flonicamid 50% WG @ 100 g a.i/ha, T_4: NSKE 5% @ 5 ml/lt, T_5: Diafenthiuron 50% WP @ 300 g a.i/ha, T_6: *V. lacanii* @ 10 g/lt, T_7: *M. anisopliae* @ 10 g/lt and T_8: Control (untreated). After three sprays the lowest mean population of jassids (1.19/3 leaves) was recorded in Flonicamid 50% WG @ 100 g a.i/ha and it was at par with Flonicamid 50% WG @ 75 g a.i/ha with (1.83/3 leaves) and second lowest mean jassids population was recorded in Diafenthiuron 50% WP @ 300 g a.i/ha) with (2.28/3 leaves) as compared to the control (17.42/3 leaves). Similar trend was observed in case of aphids and thrips. After three sprays the lowest mean population of aphid and thrips were recorded in Flonicamid 50% WG @ 100 g a.i/ha with 2.17 and 0.61/ 3 leaves which was at par Flonicamid 50% WG @ 75 g a.i/ha (2.47 and 0.94/3 leaves) and Diafenthiuron 50% WP @ 300 g a.i/ha (2.61 and 0.94/3 leaves) as compared to the untreated control with 24.75 aphids and 10.03 thrips/3 leaves. Maximum population of natural enemies was recorded in NSKE 5% @ 5 ml/lt. Maximum mean seed cotton yield (24.73 q/ha) was recorded in Flonicamid 50% WG @ 100 g a.i/ha, which was statistically at par with Flonicamid 50% WG @ 75 g a.i/ha with 23.79 q/ha, Diafenthiuron 50% WP @ 300 g a.i/ha with 23.33 q/ha and Buprofezin 25%SC @ 250 g a.i/ha with 21.73 q/ha. The increase in seed cotton yield in Flonicamid 50% WG @ 100 g a.i/ha was 51.25% over the control. The maximum net return (Rs. 62,077/ha) and B:C ratio (2.52) was obtained with Flonicamid 50% WG @ 100 g a.i/ha followed by Flonicamid 50% WG @ 75 g a.i/ha (Rs. 59,216/ha and 2.49).

Keywords: Insecticides, hybrid cotton, sucking pests, natural enemies

Introduction
Cotton is grown as a commercial crop in the western and southern parts of Odisha in upland rainfed condition. The crop occupied an area of 1.58 lakh ha during the year 2018-19 with production of 4.50 lakh bales of 170 kg each and productivity of 484 kg lint/ha (Anonymous, 2019) [1]. The productivity of cotton in the state is less as compared to the national average of 502 kg lint/ha and it is mainly due to the higher incidence of sucking pests. Further, due to monoculture over years, cotton is attacked by many chewing and sucking insects (Saeed *et al*. 2007) [2].

Among the sucking pests, aphid (*Aphis gossypii* Glover), jassids (*Amrasca biguttula biguttula* Ishida), thrips (*Thrips tabaci* Lind.) and whitefly (*Bemisia tabaci* Genn.) are the major pests of cotton (Kadam *et al*. 2014) [3]. These sucking pests are noticed at all the stages of crop growth and responsible for direct and indirect yield losses. A reduction of 22.85% in seed cotton yield due to sucking pests had been reported by Satpute *et al*. (1990) [4]. Regular and indiscriminate use of insecticides and the misuse of synthetic pesticides on the crop have led to development of insecticide resistance in target pests, pest resurgence and secondary pest outbreaks, loss of bio-diversity, environmental pollution and residual toxicity and occurrence of human health hazards. However, in present day context chemical control has its own popularity over the other methods of pest control due to its immediate action and remarkable pest control. There is

a scope of utilizing the newer molecules such as Pyridincarboxamide and Neonicotinoids which are required in small quantity and economically effective for control of sucking pests in cotton ecosystem. Also, the recent trends in pest management emphasises on nonchemical approaches and there is worldwide demand for organically grown fibre which is increasing annually in export markets. Keeping this in view, the present study was carried out to evolve the efficacy of newer insecticides and bio-pesticides for the management of major sucking pests of hybrid cotton and to find out the most cost effective insecticide treatment.

Materials and methods

The experiment was conducted during *Kharif*, 2014-15 and 2015-16 in the research field of the AICRP on Cotton at the Regional Research and Technology Transfer Station Bhawanipatna of OUAT in Kalahandi district of Odisha. The experiment was laid out in Randomized Block Design with eight treatments (Table-1) in three replications. Eight treatments *viz.*T_1: Buprofezin 25%SC @ 250 g a.i/ha, T_2: Flonicamid 50% WG @ 75 g a.i/ha, T_3: Flonicamid 50% WG @ 100 g a.i/ha, T_4: NSKE 5% @ 5 ml/lt, T_5: Diafenthiuron 50% WP @ 300 g a.i/ha, T_6: *V. lacanii* @ 10 g/lt, T_7: *M. anisopliae* @ 10 g/lt and T_8: Control (unsprayed) were evaluated against sucking pests of cotton. The sowing was done by hand dibbling with untreated seeds of cotton hybrid DCH 32 by placing 2 seeds/mount with a spacing of 90 cm x 60 cm on 13th July, 2014 and 9th July 2015. Chemical fertilizers were applied @ 120:60:60 kg N, P_2O_5 and K_2O/ha. Gap filling was done within 5-10 days after emergence of the crop and thinning was carried out at 15 days after emergence of the crop keeping one healthy seedling per mount. Intercultural and weeding operations were carried out as needed. Three sprays of insecticides were applied, first spray was done at economic threshold level (ETL) of pests and subsequent sprays were given at 15 days interval. The observations on incidence of sucking pests like aphids, jassids and thrips were recorded by visual count from three leaves (each from top, middle and bottom) and natural enemies population like spider, lady bird beetle and *Chrysoperla* per plant on five plants in each plot. The observations were recorded one day before spray and on 7th day after each spray. The plot yield in each treatment was recorded and expressed in q/ha.

The data recorded on sucking pest and natural enemies population from the experiment were subjected to square root transformation and data were analyzed following procedures laid out by Gomez and Gomez, 1984 [5]. The treatment variations were tested for significance by "F" test. The standard error of means SE(m) ± and critical differences (CD) at 5% level of significance were calculated following the standard procedure and treatment means were compared using critical differences(CD).

Results and discussion

Effect on jassids population

The data presented in Table 1. revealed that jassids population varied from 6.75 – 7.33/3 leaves before first spray. Significant differences were observed for population of sucking pests in cotton for different treatments under study. After first spray the minimum mean population of jassids (2.00/3 leaves) was recorded in T_3 (Flonicamid 50% WG @ 100 g a.i/ha) followed by T_2 (Flonicamid 50% WG @ 75 g a.i/ha) with (2.67/ 3 leaves) which was at par with T_5 (Diafenthiuron 50% WP @ 300 g a.i/ha) with (3.25 / 3 leaves) and T_1 (Buprofezin 25%SC @ 250 g a.i/ha) with (3.33/3 leaves). The same trend of efficacy was observed after 2nd spray. Among the treatments, Flonicamid 50% WG @ 100 g a.i/ha showed minimum jassids population (1.08 / 3 leaves) followed by Flonicamid 50% WG @ 75 g a.i/ha (1.83 / 3 leaves) and was at par with Diafenthiuron 50% WP @ 300 g a.i/ha (2.33 / 3 leaves). After 3rd spray minimum population was recorded with Flonicamid 50% WG @ 100 g a.i/ha (0.50/3 leaves) and it was at par with Flonicamid 50% WG @ 75 g a.i/ha (1.00 / 3 leaves). Next effective treatment was Diafenthiuron 50% WP @ 300 g a.i/ha (1.25 / 3 leaves). Untreated control plot recorded maximum jassids population throughout investigation (Table-1).

After consecutive three sprays in different treatments, jassid population was less than the control. The lowest mean population of jassids (1.19 / 3 leaves) was recorded in T_3 (Flonicamid 50% WG @ 100 g a.i/ha) and it was at par with T_2 (Flonicamid 50% WG @ 75 g a.i/ha) with (1.83 / 3 leaves) and second lowest jassids mean population was recorded inT_5 (Diafenthiuron 50% WP @ 300 g a.i/ha) with (2.28 / 3 leaves) as compared to the control (17.42/3 leaves) T_8. The present findings are in agreement with Chinna Babu Naik *et al.* (2017) [6] who reported that Flonicamid 50 WG is very effective in managing cotton leaf hopper. Per cent reduction of leaf hopper population was found higher with flonicamid @ 75 g a.i./ha reported by Chandi *et al.* (2016) [7]. Similar results were obtained by Kadam *et al.* (2014) [3] and Kumar *et al*. (2011) [8] who observed that maximum mortality of jassids was found in flonicamid treated plot.

Effect on aphids population

During the present investigation, the population of aphids was in the range of 13.50 – 21.25/3 leaves in all the treatments before first spray (Table 1). Significant differences between treatments were recorded after 1st spray. Flonicamid 50% WG @ 100 g a.i/ha (3.00 aphids / 3 leaves) was the most effective treatment for managing the aphids population and was at par with Diafenthiuron 50% WP @ 300 g a.i/ha (3.50 / 3 leaves) and Flonicamid 50% WG @ 75 g a.i/ha (3.58 / 3 leaves) followed by Buprofezin 25%SC @ 250 g a.i/ha with 5.50 aphids/3 leaves. The same efficacy trend was observed after 2nd and 3rd spray recording minimum aphids population in Flonicamid 50% WG @ 100 g a.i/ha (2.08 & 1.42 aphids / 3 leaves) and it was at par with Diafenthiuron 50% WP @ 300 g a.i/ha (2.00 & 1.92 aphids / 3 leaves) and Flonicamid 50% WG @ 75 g a.i/ha (2.58 & 1.67 / 3 leaves). After three sprays the lowest mean aphids (2.17 / 3 leaves) population was recorded in T_3 (Flonicamid 50% WG @ 100 g a.i/ha) which was at par with T_2 (Flonicamid 50% WG @ 75 g a.i/ha) with 2.47 / 3 leaves and T_5 (Diafenthiuron 50% WP @ 300 g a.i/ha) with 2.61/ 3 leaves as compared to the untreated control plot (24.75/3 leaves). The present results are comparable with the observations of Ghelani *et al.* (2014) [9] who reported that the treatments with flonicamid caused significantly maximum mortality of aphids. Gaurkhede *et al.* (2015) [10] observed minimum aphid population in the plots treated with flonicamid 50 WG @ 0.02 per cent. Similarly, Samih *et al.* (2011) [11] obtained highest aphid mortality with flonicamid in the laboratory experiment under control condition. According to Morita *et al.* (2014) [12] flonicamid wasa very active against wide range of aphid species and also effective against some other species of sucking insects.

Effect on thrips population

The results of pooled data of the two years (2014-15 & 2015-16) on the efficacy of insecticides against thrips are shown in Table-1. The thrips population recorded during the study period was very low. During the evaluation, the mean population of thrips before initiation of spray was uniform ranging from 7.67 – 8.58 thrips/3 leaves. Similar trend was observed in case of thrips, after 1st, 2nd and 3rd spray. Flonicamid 50% WG @ 100 g a.i/ha (0.83, 0.42 & 0.58 thrips / 3 leaves) was found most effective treatment for managing the thrips population and was at par with Flonicamid 50% WG @ 75 g a.i/ha (1.08, 0.83 & 0.92 thrips/ 3 leaves) and Diafenthiuron 50% WP @ 300 g a.i/ha (1.25, 0.83 & 0.75 thrips / 3 leaves). After three sprays the lowest mean population of thrips was recorded in Flonicamid 50% WG @ 100 g a.i/ha with 0.61 thrips/ 3 leaves which was at par Flonicamid 50% WG @ 75 g a.i/ha and Diafenthiuron 50% WP @ 300 g a.i/ha with 0.94/ 3 leaves as compared to the untreated control with 10.03/3 leaves. These findings are in comfirmity with those obtained by Gaurkhede *et al.* (2015) [10] who reported that fipronil 5 SC, flonicamid 50WG, dinotefuran 20 SG and acetamiprid 20 SP effectively minimized the thrips density. Ghelani *et al.* (2014) [9] and Ravikumar et al. (2016) [13] observed maximum mortality of thrips with flonicamid 50WG application. Similar results were also documented by Meghana *et al.* (2018) [14], Sathyan *et al.* (2016) [15] and Patil *et al.* (2009) [16].

Present investigation clearly indicates that insecticidal treatments were highly efficient in managing the sucking insect pests than bio-pesticides. Results of present study are in close agreement with findings of Roa *et al.* (1991) [17] and Ghelani *et al.* (2006) [18] who reported that bio-pesticides (botanical and microbial) were less effective over the chemical pesticides against sucking pest of okra.

Table 1: Effect of the different treatments on population of jassids, aphids and thrips

Treatment	Mean population of jassids /3 leaves					Mean population of aphids /3 leaves					Mean population of thrips /3 leaves				
	Before spray	After 1st spray	After 2nd spray	After 3rd spray	Mean of 3 sprays	Before spray	After 1st spray	After 2nd spray	After 3rd spray	Mean of 3 sprays	Before spray	After 1st spray	After 2nd spray	After 3rd spray	Mean of 3 sprays
T_1: Buprofezin 25%SC @ 250g ai/ha	7.33 *(2.80)	3.33 (1.96)	3.00 (1.87)	3.00 (1.87)	3.11 (1.90)	20.67 (4.59)	5.50 (2.44)	3.42 (1.97)	2.42 (1.70)	3.78 (2.04)	7.67 (2.86)	2.42 (1.70)	1.58 (1.44)	1.08 (1.25)	1.69 (1.46)
T_2: Flonicamid 50% WG @ 75g ai/ha	6.92 (2.72)	2.67 (1.78)	1.83 (1.53)	1.00 (1.22)	1.83 (1.51)	18.75 (4.39)	3.58 (2.02)	2.58 (1.75)	1.67 (1.47)	2.47 (1.71)	8.25 (2.96)	1.08 (1.25)	0.83 (1.15)	0.92 (1.19)	0.94 (1.20)
T_3: Flonicamid 50% WG @ 100g ai/ha	6.75 (2.69)	2.00 (1.58)	1.08 (1.25)	0.50 (0.99)	1.19 (1.28)	15.00 (3.92)	3.00 (1.87)	2.08 (1.60)	1.42 (1.38)	2.17 (1.62)	8.00 (2.91)	0.83 (1.15)	0.42 (0.94)	0.58 (1.03)	0.61 (1.04)
T_4: NSKE 5%	7.08 (2.75)	5.58 (2.47)	8.67 (3.03)	6.83 (2.70)	7.03 (2.73)	21.25 (4.65)	12.25 (3.57)	10.33 (3.29)	9.33 (3.13)	10.64 (3.33)	8.25 (2.95)	6.00 (2.55)	6.08 (2.56)	5.08 (2.36)	5.72 (2.49)
T_5: Diafenthiuron 50% WP @ 300g ai/ha	7.08 (2.75)	3.25 (1.93)	2.33 (1.68)	1.25 (1.31)	2.28 (1.64)	20.33 (4.56)	3.50 (2.00)	2.00 (1.58)	1.92 (1.55)	2.61 (1.75)	8.25 (2.95)	1.25 (1.32)	0.83 (1.15)	0.75 (1.11)	0.94 (1.19)
T_6: *V.lacanii* @ 10 g/lit	6.83 (2.70)	6.17 (2.58)	8.17 (2.94)	7.83 (2.88)	7.39 (2.80)	13.50 (3.71)	10.42 (3.30)	10.67 (3.34)	11.42 (3.45)	10.83 (3.36)	8.58 (3.01)	6.33 (2.61)	5.50 (2.45)	5.08 (2.36)	5.64 (2.47)
T_7: *M.anisopliae* @ 10 g/lit	7.00 (2.74)	6.42 (2.63)	8.17 (2.94)	9.08 (3.09)	7.89 (2.89)	19.42 (4.46)	12.25 (3.57)	11.08 (3.40)	11.00 (3.39)	11.44 (3.45)	8.58 (3.01)	6.33 (2.61)	5.50 (2.45)	5.42 (2.43)	5.75 (2.50)
T_8: Control	6.92 (2.72)	11.17 (3.42)	21.33 (4.67)	19.75 (4.50)	17.42 (4.20)	17.50 (4.24)	22.75 (4.82)	26.33 (5.18)	25.17 (5.06)	24.75 (5.02)	8.33 (2.96)	10.83 (3.37)	9.67 (3.19)	9.58 (3.17)	10.03 (3.24)
SE(m)	0.09	0.09	0.11	0.14	0.11	0.29	0.13	0.13	0.14	0.13	0.15	0.10	0.14	0.09	0.11
CD(0.05)	0.20	0.19	0.24	0.31	0.24	0.61	0.28	0.28	0.30	0.29	0.32	0.22	0.30	0.20	0.24
CV %	4.10	4.65	5.46	7.55	5.89	8.12	5.44	5.83	6.58	5.95	6.28	6.21	9.07	5.99	7.09

*Figure in parenthesis are square root transformed values

Table 2: Effect of the different treatments on population of natural enemies of cotton

Treatment	Mean population of spiders /plant					Mean population of lady bird beetle /plant					Mean population of *chrysoperla* /plant				
	Before spray	After 1st spray	After 2nd spray	After 3rd spray	Mean of 3 sprays	Before spray	After 1st spray	After 2nd spray	After 3rd spray	Mean of 3 sprays	Before spray	After 1st spray	After 2nd spray	After 3rd spray	Mean of 3 sprays
T_1: Buprofezin 25%SC @ 250g ai/ha	0.67 *(1.07)	0.27 (0.87)	0.13 (0.79)	0.13 (0.79)	0.18 (0.82)	0.47 (0.98)	0.13 (0.79)	0.07 (0.75)	0.07 (0.75)	0.09 (0.76)	0.13 (0.79)	0.07 (0.75)	0.07 (0.75)	0.07 (0.75)	0.07 (0.75)
T_2: Flonicamid 50% WG @ 75g ai/ha	0.60 (1.04)	0.20 (0.83)	0.13 (0.79)	0.07 (0.75)	0.13 (0.79)	0.27 (0.87)	0.13 (0.79)	0.13 (0.79)	0.07 (0.75)	0.11 (0.78)	0.13 (0.79)	0.07 (0.75)	0.07 (0.75)	0.00 (0.71)	0.04 (0.74)
T_3: Flonicamid 50% WG @ 100g ai/ha	0.67 (1.08)	0.13 (0.79)	0.07 (0.75)	0.07 (0.75)	0.09 (0.76)	0.60 (1.05)	0.07 (0.75)	0.07 (0.75)	0.07 (0.75)	0.07 (0.75)	0.20 (0.83)	0.07 (0.75)	0.00 (0.71)	0.00 (0.71)	0.02 (0.72)
T_4: NSKE 5%	0.53 (1.02)	0.80 (1.14)	0.80 (1.14)	0.87 (1.17)	0.82 (1.15)	0.47 (0.98)	0.33 (0.91)	0.73 (1.11)	0.60 (1.05)	0.56 (1.02)	0.07 (0.75)	0.27 (0.87)	0.33 (0.91)	0.27 (0.87)	0.29 (0.88)
T_5: Diafenthiuron 50% WP @ 300g ai/ha	0.73 (1.11)	0.27 (0.87)	0.13 (0.79)	0.07 (0.75)	0.16 (0.81)	0.33 (0.91)	0.07 (0.75)	0.13 (0.79)	0.07 (0.75)	0.09 (0.76)	0.20 (0.83)	0.07 (0.75)	0.07 (0.75)	0.00 (0.71)	0.04 (0.74)
T_6: *V.lacanii* @ 10 g/lit	0.73 (1.10)	0.60 (1.05)	0.67 (1.08)	0.67 (1.08)	0.64 (1.07)	0.40 (0.94)	0.27 (0.87)	0.47 (0.98)	0.53 (1.01)	0.42 (0.96)	0.20 (0.83)	0.27 (0.87)	0.20 (0.83)	0.27 (0.87)	0.24 (0.86)
T_7: *M.anisopliae* @ 10 g/lit	0.80 (1.13)	0.47 (0.98)	0.73 (1.11)	0.60 (1.05)	0.60 (1.05)	0.33 (0.91)	0.33 (0.91)	0.53 (1.01)	0.40 (0.94)	0.42 (0.95)	0.13 (0.79)	0.20 (0.84)	0.13 (0.79)	0.20 (0.83)	0.18 (0.82)
T_8: Control	0.67 (1.08)	0.93 (1.20)	1.33 (1.35)	1.20 (1.30)	1.16 (1.28)	0.33 (0.91)	0.47 (0.98)	0.67 (1.08)	0.73 (1.11)	0.62 (1.06)	0.20 (0.84)	0.47 (0.98)	0.33 (0.91)	0.40 (0.94)	0.40 (0.95)
SE(m)	0.11	0.06	0.07	0.06	0.06	0.07	0.07	0.06	0.07	0.07	0.08	0.07	0.07	0.08	0.07
CD(0.05)	0.24	0.14	0.16	0.12	0.14	0.15	0.14	0.13	0.16	0.14	0.18	0.16	0.15	0.17	0.16
CV %	12.61	8.12	9.20	7.19	8.17	9.30	9.45	8.11	10.00	9.19	12.49	11.06	11.03	12.05	11.38

*Figure in parenthesis are square root transformed values

Effect on natural enemies

Before first spraying population of spider, lady bird beetle and *chrysoperla* were 0.53 – 0.80/plant, 0.27 – 0.60/plant and 0.07 – 0.20/plant, respectively (Table-2).

Spider

Among the insecticides treatments, after first spraying NSKE 5% @ 5 ml/lt recorded maximum spider population (0.80 spider/plant) followed by *V. lacanii* @ 10 gms/lt (0.60/ plant) which was at par with *M. anisopliae* @ 10 gms/lt (0.47/ plant) and the same trend was observed after 2nd and 3rd spray. However, more number of spider populations was observed in untreated control plot.

Lady bird beetle

Population of lady bird beetle after 1st, 2nd and 3rd spraying followed similar of trend as that of the spider (Table 2). NSKE 5% @ 5 ml/lt recorded maximum lady bird beetle population and was at par with *V. lacanii* @ 10 gms/lt and *M.anisopliae* @ 10 gms/lt. Flonicamid 50% WG @ 75 g a.i/ha was the next best treatment being at par with Buprofezin 25%SC @ 250 g a.i/ha, Flonicamid 50% WG @ 100 g a.i/ha and Diafenthiuron 50% WP @ 300 g a.i/ha. Untreated control recorded maximum lady bird beetle population throughout the investigation.

Chrysoperla

The data on the cumulative effect of spraying indicated that there was no significant difference among the insecticides treatments in respect to population of *chrysoperla* (Table-2). However, more number of *chrysoperla* was observed in untreated control plot. The present investigations are comparable with the observations of Ogah *et al*. (2011) [29] who reported that neem seed kernel extract (NSKE 5%) recorded maximum number of natural enemies.

Table 3: Effect of different insecticides on yield and economics of cotton (Pooled data, *Kharif* 2014-15 and 2015-16)

Treatment	Seed Cotton Yield (q/ha)	Gross returns (Rs./ha)	Cost of cultivation (Rs./ha)	Net returns (Rs./ha)	B:C ratio
T_1: Buprofezin 25%SC @ 250g ai/ha	21.73	90,397	37,500	52,897	2.41
T_2: Flonicamid 50% WG @ 75g ai/ha	23.79	98,966	39,750	59,216	2.49
T_3: Flonicamid 50% WG @ 100g ai/ha	24.73	1,02,877	40,800	62,077	2.52
T_4: NSKE 5%	20.99	87,318	37,200	50,118	2.34
T_5: Diafenthiuron 50% WP @ 300g ai/ha	23.33	97,053	41,400	55,653	2.34
T_6: *V.lacanii* @ 10 g/lit	19.60	81,536	40,200	41,336	2.02
T_7: *M.anisopliae* @ 10 g/lit	20.82	86,611	40,500	46,111	2.14
T_8: Control	16.35	68,016	34,000	34,016	1.89
SE(m)	1.44	-	-	-	-
CD(0.05)	3.08	-	-	-	-
CV %	8.16	-	-	-	-

*Market price of seed cotton (2016): Rs. 41.60/kg

Effect on yield and economics

Pooled yield data over two years revealed that there was significant impact of insecticidal treatments on seed cotton yield (Table-3). Maximum mean seed cotton yield (24.73 q/ha) was recorded in T_3 (Flonicamid 50% WG @ 100 g a.i/ha) which was statistically at par with T_2 (Flonicamid 50% WG @ 75 g a.i/ha) with 23.79 q/ha, T_5 (Diafenthiuron 50% WP @ 300 g a.i/ha) with 23.33 q/ha and T_1 (Buprofezin 25%SC @ 250 g a.i/ha) with 21.73 q/ha. The lowest yield of 16.35 q/ha was recorded in untreated control plot. The increase in seed cotton yield in T_3 (Flonicamid 50% WG @ 100 g a.i/ha) was 51.25% over the control. Net return was higher in Flonicamid 50% WG @ 100 g a.i/ha (Rs. 62,077/ha) treatment followed by Flonicamid 50% WG @ 75 g a.i/ha (Rs. 59,216/ha) and Diafenthiuron 50% WP @ 300 g a.i/ha (Rs. 55,653/ha) treatment. Flonicamid 50% WG @ 100 g a.i/ha (T_3) recorded the highest B:C ratio (2.52) followed by (T_2) Flonicamid 50% WG @ 75 g a.i/ha (2.49).

Conclusion

It can be concluded from the experiment that sucking pests of cotton like aphids, jassids and thrips can be effectively and economically controlled with spray of Flonicamid 50% WG @ 100 g a.i/ha at ETL and two consecutive sprays at 15 days interval. It recorded seed cotton yield of 24.73 q/ha which was 51.25% more over control with maximum B:C ratio of 2.52.

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