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Efficacy of different insecticidal treatment schedules against aphid and whitefly on brinjal

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A B S T R A C T

In the present study, the efficacy of different insecticidal treatment schedules against aphid and whitefly on brinjal was studied by conducting two field experiments at 'Adisaptagram Block Seed Farm, Hooghly, West Bengal, India in two consecutive kharif seasons *i.e.,* 2010 and 2011. The experiment was laid in RBD with seven treatment schedules and three replications. Among all the treatments soil application of phorate at transplanting, followed by foliar spray with aceaphte, thiodicarb and *Bacillus thuringiensis* var. *kurstaki* at 50, 70 and 90 days after transplanting, respectively and seedling treatment with imidacloprid before transplanting, succeeded by foliar spray with imidacloprid, novaluron, *B. thuringiensis* var. *kurstaki* and novaluron at 30, 50, 70 and 90 days after transplanting were most effective in reducing the aphid and whitefly population over control during both the years of study. Consequently both the treatment schedules achieved maximum marketable fruits of brinjal as well as highest monetary return than the other treatments.

Keywords: Insecticide, treatment-schedules, brinjal, aphid, whitefly

Introduction

Brinjal (*Solanum melongena* L.) is one of the widely used vegetable crop by most of the people and is popular in many countries *viz.,* Central, South and South East Asia, some parts of Africa and Central America (Harish *et al*. 2011). Though brinjal is a summer crop, it is being grown throughout the year under irrigated condition. Hence, it is subjected to attack by number of insect pests right from nursery stage till harvesting (Regupathy *et al.* 1997, Lal 1975 and Bandopadhyay 1985). Aphid, (*Aphis gossypii* Glov.) (Aphididae: Hemiptera) and white fly (*Bemisia tabaci* Gennadius) (Aleyrididae: Hemiptera)suck the cell sap and prohibit the normal crop growth. The infested plants become weak, pale and stunted in growth which consequently results in reduced fruit size. Brinjal being a vegetable crop, use of chemical insecticides for pest management will leave considerable toxic residues on the fruits. Besides this, sole dependence on insecticides for the control of the pests like aphids and whiteflies has led to insecticidal resistance and resurgence. Keeping these ecological backlashes in mind, combination of bio-rational, microbial and some synthetic insecticidal treatment schedules have been taken up for evaluation against brinjal aphid and whitefly.

Materials and methods

Efficacy of different insecticidal treatment schedules against aphid and whitefly in brinjal was studied by setting field experiments at Adisaptagram Block Seed Farm, Hooghly, West Bengal, India in two consecutive kharif seasons *i.e.,* 2010 and 2011. The experiment was laid in RBD with seven treatment schedules and three replications. For this, the brinjal seedlings (cv. Muktakashi) were transplanted by the end of June in 3.75m X 4.50m plots having 75cm x 75cm spacing. All the standard agronomic practices were followed for raising the crop along with the pesticidal treatments at frequent intervals. The treatment schedules were consisting of both chemical and non chemical insecticides. The data of aphid and whitefly were taken from three leaves per plant, one each from upper, middle and lower from randomly selected

Treatment	Insecticides with dose and time of application
T1	i) Soil application of neem cake @ 250kg/ha before transplanting ii) Foliar spray with chlorpyriphos 20EC + cypermethrin5EC @1.5 ml/litre of water at 30 DAT iii) Foliar spray with cartap hydrochloride 50SP @ 1g/litre of water at 50DAT iv) Foliar spray with azadirachtin 1EC @ 4ml/litre of water at 70 DAT
T2	i) Soil application of phorate10G @1.50 Kg a.i./ha before transplanting ii) Foliar spray with acephate 75SP @ 0.75g/litre of water at 50 DAT iii) Foliar spray with thiodicarb 75WP @ 0.75g/litre of water at 70 DAT iv) Foliar spray with *Bacillus thuringiensis* var. *kurstaki* 5WP @ 1.5g/litre of water at 90 DAT
T3	i) Foliar spray with fipronyl 5SC @ 0.5g/litre of water at 30 DAT ii) Foliar spray with novaluron 10EC @ 0.75ml/litre of water at 50 DAT iii) Foliar spray with deltamethrin 2.8EC @ 0.5ml/litre of water at 70 DAT iv) Foliar spray with fenvalerate 20EC @ 0.5ml/litre of water at 90 DAT
T4	i) Seedling treatment with carbosulfan 25EC @ 2ml/litre of water before transplanting ii) Foliar spray with monocrotophos 36SL @ 1.5ml/litre of water at 30 DAT iii) Foliar spray with endosulfan 35EC @ 2ml/litre of water at 50 DAT iv) Foliar spray with *B. thuringiensis* var. *kurstaki* 5WP @ 1.5g/litre of water at 70 DAT v) Foliar spray with *B. thuringiensis* var. *kurstaki* 5WP @ 1.5g/litre of water at 90 DAT
T5	i) Seedling treatment with imidacloprid 17.8SL @ 3ml/10 litre of water before transplanting ii) Foliar spray with imidacloprid 17.8SL @ 1/7.5 litre of water at 30 DAT iii) Foliar spray with novaluron 10EC @ 0.75ml/litre of water at 50 DAT iv) Foliar spray with *B. thuringiensis* var. *kurstaki* 5WP @ 1.5g/litre of water at 70 DAT v) Foliar spray with novaluron 10EC @ 0.75ml/litre of water at 90 DAT
T6	i) Foliar spray with thiamethoxam 25WG @ 1g/3 litre of water at 30 DAT ii) Foliar spray with spinosad 2.5EC @ 1ml/3 litre of water at 50 DAT iii) Foliar spray with abamectin 1.9EC @ 2ml/litre of water at 70 DAT
T7	Only water spray (Control)

10 plants per plot. The data then statistically analysed following RBD format. The treatment schedules are as follows.

Result and Discussion

Efficacy of different insecticidal treatments schedule against aphid

In the first year of experiment at 2010 regarding the efficacy of different insecticidal treatment schedules against aphid, all the treatment schedules were significantly superior over control throughout the entire period of study (Table 1). The pest was first appeared during middle of July in T_7 (control) along with T_3, T_4 and T_6 while in T_5, it was first observed far later than the others in early September. But instead of T_5, T_2 was most effective in controlling the aphids throughout the crop life as only 19.78 mean aphid population per 30 leaves, were found in this treatment, this was followed by T_5 (22.66), T_4 (27.09), T_1 (34.54), T_3 (39.69), T_6 (43.15), and T_7 (151.7), respectively. Similarly, the per cent decrease of aphid population over control was found maximum in T_2 (86.95) followed by T_5 (85.05), T_4 (82.13), T_1 (77.21), T_3 (73.81) and T_6 (71.53), respectively.

In second year of experiment at 2011 also all the treatment schedules were statistically significant in reducing aphid population over control throughout the crop life (Table 2). During this year, the pest was first appeared in mid July in untreated check (T_7) along with T_3 and T_6. The mean aphid population load per 30 leaves was found minimum in T_2 (21.51), followed by T_5 (22.54), T_4 (25.60), T_3 (35.63), T_1 (38.78), T_6 (39.93) and T_7 (148.48), respectively. Consequently, T2 gave maximum percentage of decrease of population (85.51) over control followed by T5 (85.02), T4 (82.76), T3 (73.88) and T6 (73.11), respectively.

It is evident from the results of the study that though all treatment schedules were significantly superior over control in decreasing aphid population on brinjal throughout the crop life, T_2 (consisting of soil application of phorate 10G before transplanting, followed by foliar spray with acephate 75SP at 50 days after transplanting (DAT), thiodicarb 75WP at 70 DAT and *Bacillus thuringiensis* var *kurstaki* 5WP at 90 DAT) and T_5 (receiving seedling treatment with imidacloprid 17.8SL before transplanting, followed by foliar spray with imidacloprid 17.8SL at 30 DAT, novaluran 10EC at 50 DAT, *Bacillus thuringiensis* var *kurstaki* 5WP at 70 DAT and novaluron 10EC at 90 DAT) were most effective against the pest. This is because of the fact that during population development of the pest (i.e. early to full vegetative phase of brinjal) the crop was sprayed with systemic insecticides like phorate, acephate and imidacloprid and as a result, the pest population did not grow high. Consequently, these two treatment schedules (T_2 and T_5) gave maximum percentage of decrease of population (85.51-86.95% and 85.02-85.05%) over control. It may due to application of systemic insecticides with higher persistency like phorate, acephate and imidacloprid (Roy 2002). Reghunath *et al.* (1989) and Jarande & Dethe (1994) also observed lower population of aphid on brinjal, when the crop was treated with either phorate or imidacloprid. In addition to this, T_4 gave quite better results (82.13-82.76% decrease of aphid population over control) than the others. Because in this case, the crop was treated with carbosulfan 25EC, monocrotophos 36SL and endosulfan 35EC during early to full vegetative stage of the crop. This observation is in agreement with that of Dhamdhere & Mathur (1994); Mall *et al.* (1997); Kadam *et al.* (2005); Khalequzzaman & Jesmun-Nahar (2008); Mandal *et al.*(2010) and Munde *et al.* (2011) where it was documented that monocrotophos, carbosulfan and endosulfan were quite effective against aphid on brinjal.

Efficacy of different insecticidal treatments schedule against whitefly

During first year of experiment (2010), it has been observed that all the treatment schedules were significantly superior over control in reducing the whitefly population on brinjal, but not throughout the growing season of crop (Table 3). In T_2 and T_5, lower pest population was observed up to early reproductive stage of the crop. Consequently, the mean whitefly population was found minimum in T_2 (5.84 per 30 leaves), followed by T_5 (7.91), T_6 (8.93), T_4 (10.51), T_4 (12.36), T_7 (22.51), respectively and hence, T_2 obtained T_3 (13.66) maximum percentage of decrease of pest population (74.05) over control and then T_5 (64.86), T_6 (60.33), T_4 (53.31), T_2 (45.09) and T_3 (39.31), respectively.

During the second year of study (2011) also, the treatments were not always significantly superior over untreated check in controlling the pest population on brinjal (Table 4). This year,

the aleurodid was appeared on the crop just after transplanting. Unlike the first year, the mean whitefly population was found lowest in T_5 (6.72 per 30 leaves) and then in the order were T_2 (9.51), T_4 (11.39), T_6 (12.33), T_2 (14.42), T_3 (19.36) and T_7 (31.45), respectively. Therefore, the per cent decrease of pest population was obtained maximum in T_5 (78.63) over control and followed by T_2 (69.79), T_4 (63.78), T_6 (60.79), T_1 (54.15) and T_3 (38.44), respectively.

From the present field experiments, it is clear that all the treatment schedules were statistically significant in decreasing the pest population over the control, but not all round the season. Specially, during later part of crop growth stage, the schedules were insignificant among themselves. There were two reasons behind this. Firstly, during this period, the pest population become lower naturally and secondly, during later crop growth stage, the schedules consisting of mainly contact insecticides not systemic insecticides. Among the treatment schedules, T_2 and T_5 were most effective as they supported 69.79-74.05% and 64.86-78.63% decrease of population over control. It may be due to application of systemic insecticides with higher persistency like phorate, acephate and imidacloprid (Roy 2002). Singh & Jaglan (2001); Anandkumar *et al.* (2003) also recorded lower whitefly population in phorate and imidacloprid treated plots. In addition to these, T_4 and T_6 also gave quite satisfactory results (53.31-63.78% and 60.33-60.79% decrease of population over control). Because in T_4, the crop was treated with monocrotophos at 30 DAT, followed by endosulfan at 50 DAT. These results are also in line with the findings of Borad *et al.* (2002); Muthukumar & Kalyanasundaram (2003); Patel *et al.* (2006); Biswas & Chatterjee (2008) and Mandal *et al.* (2010). On the other hand, the lower population of whitely, obtained in T6, was may be due to application of thiamethoxam 25WG during early crop growth stage as it was found quite effective against the pest by Biswas & Chatterjee (2008).

Economics of different insecticidal treatment schedules against aphid and whitefly on brinjal

The data shown in table 5, depict that the marketable yield (t/ha) of brinjal fruit in 2010 was found maximum in T_1 (13.89), followed by T_6 (13.28), T_3 (12.68), T_2 (12.25), T_4 (11.68), T_5 (10.87) and T_7 (8.38), respectively. Hence, T_1 gave highest net profit per ha (Rs. 48,306) over control, succeeded by T_3 (Rs. 39,380), T_6 (Rs. 38,228), T_2 (Rs. 35,393), T_4 (Rs. 30,210) and T_5 (Rs. 20,943), respectively. But the cost benefit ratio (CBR) was found maximum in T_3 (1: 20.73), followed by T_4 (1: 20.55), T_2 (1: 20.12), T_1 (1: 10.52), T_5 (1: 7.07) and T_6 (1: 4.34) respectively.

During 2011 also, the marketable fruit yield (t/ha) was recorded maximum in T_1 (14.29), followed by T_6 (13.48), T_3 (13.32), T_4 (11.83), T_2 (11.74), T_5 (10.74) and T_7 (7.83), respectively (Table 6). However, T_6 was most costly (Rs. 8,812/ha) while T_4 was least costly (Rs. 1,470/ha) but the highest net profit (Rs/ha) over control was returned from T_1 (Rs. 52,258), succeeded by T_3 (Rs. 46,412), T_6 (Rs. 40,859), T_4 (Rs. 33,730), T_2 (Rs. 32,649) and T_5 (Rs. 22,647), respectively. Thus, T_3 achieved maximum monetary return (1: 24.43) over control, followed by T_4 (1: 22.94), T_2 (1: 18.50), T_1 (1: 11.38), T_5 (1: 7.65) and T_6 (1: 4.61) respectively.

It is evident that among the treatment schedules, T_1, T_3 and T_6 yielded greater quality of marketable fruits. But the CBR was always found maximum in T_3 (1:20.73-24.43). Because in this schedule, two synthetic pyrethroids were used, which most effective against pests of brinjal. Though, T_1

yielded maximum quantity of marketable fruits, but it was not so economical due to higher dosages of neem cake and neem oil. Similarly, T_6 did not give satisfactory monetary returns as the cost of insecticides, used in this schedule was very high. The findings of Jena *et al.* (2005) and Tripathy *et al.* (2005) are more or less similar to the results of present study.

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Table 1.
Efficacy of different insecticidal treatments schedule against aphid on brinjal during 2010

Treatment schedule	Population of the pest on different dates of observation											Mean	% decrease over control
	July			August			September			October			
	I	II	III	I	II	III	I	II	III	I	II		
T1	0.00	0.00	9.33	16.33	53.33	32.66	74.33	43.66	27.66	48.33	74.33	34.54	77.21
	(0.00)	(0.00)	(0.97)	(1.22)	(1.73)	(1.50)	(1.87)	(1.63)	(1.45)	(1.68)	(1.87)		
T2	0.00	0.00	0.00	12.66	48.33	15.33	23.66	10.66	36.00	23.33	47.66	19.78	86.95
	(0.00)	(0.00)	(0.00)	(1.11)	(1.68)	(1.20)	(1.38)	(1.03)	(1.56)	(1.37)	(1.68)		
T3	0.00	21.33	63.33	12.00	23.66	41.33	86.66	32.33	59.33	41.33	57.33	36.69	73.81
	(0.00)	(1.31)	(1.80)	(1.07)	(1.38)	(1.61)	(1.93)	(1.50)	(1.77)	(1.61)	(1.76)		
T4	0.00	7.66	21.33	10.33	17.33	14.66	31.66	26.33	51.66	73.33	43.66	27.09	82.13
	(0.00)	(0.89)	(1.33)	(1.02)	(1.23)	(1.16)	(1.49)	(1.43)	(1.71)	(1.86)	(1.64)		
T5	0.00	0.00	0.00	0.00	0.00	0.00	24.66	37.66	79.33	42.33	65.33	22.66	85.05
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(1.39)	(1.57)	(1.90)	(1.63)	(1.82)		
T6	0.00	32.66	71.66	21.00	29.33	20.33	46.33	34.66	72.66	95.33	50.66	43.15	71.53
	(0.00)	(1.51)	(1.85)	(1.32)	(1.45)	(1.31)	(1.66)	(1.53)	(1.86)	(1.98)	(1.70)		
T7	0.00	26.33	57.33	140.33	216.66	273.66	338.33	294.33	176.66	102.33	41.33	151.57	
	(0.00)	(1.42)	(1.75)	(2.14)	(2.33)	(2.44)	(2.53)	(2.47)	(2.25)	(2.00)	(1.61)		
S. Em. (±)	-	0.09	0.08	0.09	0.08	0.08	0.07	0.09	0.06	0.08	0.06		
C. $D._{0.05}$	-	0.23	0.21	0.23	0.20	0.21	0.19	0.24	0.16	0.20	0.16		

Figures in parenthesis are logarithmic transformed values.

Table 2.
Efficacy of different insecticidal treatments schedule against aphid on brinjal during 2011

Treatment schedule	Population of the pest on different dates of observation											Mean	% decrease over control
	July			August			September			October			
	I	II	III	I	II	III	I	II	III	I	II		
T1	0.00 (0.00)	0.00 (0.00)	14.66 (1.16)	10.66 (1.03)	46.33 (1.65)	39.33 (1.59)	85.66 (1.93)	36.33 (1.56)	61.00 (1.78)	82.33 (1.91)	50.33 (1.70)	38.78	73.88
T2	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	18.33 (1.26)	42.66 (1.62)	13.66 (1.14)	22.66 (1.36)	16.33 (1.22)	41.33 ()1.61	33.33 (1.51)	48.33 (1.68)	21.51	85.51
T3	0.00 (0.00)	16.33 (1.22)	45.66 (1.65)	13.66 (1.12)	27.33 (1.43)	49.33 (1.69)	77.66 (1.89)	32.33 (1.51)	57.66 (1.75)	29.33 (1.47)	42.66 (1.63)	35.63	76.00
T4	0.00 (0.00)	0.00 (0.00)	10.33 (1.03)	4.66 (0.72)	23.66 (1.38)	14.33 (1.16)	36.33 (1.55)	28.00 (1.45)	69.66 (1.84)	40.33 (1.61)	54.33 (1.73)	25.60	82.76
T5	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	6.33 (0.81)	20.66 (1.32)	16.33 (1.22)	49.66 (1.69)	63.33 (1.80)	88.33 (1.94)	22.24	85.02
T6	0.00 (0.00)	12.33 (1.10)	53.33 (1.72)	18.33 (1.26)	26.33 (1.42)	15.66 (1.20)	38.66 (1.58)	24.66 (1.40)	76.00 (1.88)	106.33 (2.02)	67.66 (1.81)	39.93	73.11
T7	0.00 (0.00)	19.66 (1.30)	42.66 (1.62)	103.33 (2.01)	176.33 (2.24)	217.66 (2.34)	273.00 (2.43)	321.33 (2.51)	268.33 (2.43)	149.66 (2.17)	61.33 (1.79)	148.48	
S. Em. (±)	-	0.05	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.03	0.02		
C. D. $_{0.05}$	-	0.12	0.14	0.14	0.10	0.10	0.07	0.06	0.06	0.07	0.04		

Figures in parenthesis are logarithmic transformed value

Table 3.
Efficacy of different insecticidal treatments schedule against whitefly on brinjal during 2010

Treatment schedule	Population of the pest on different dates of observation											Mean	% decrease over control
	July			August			September			October			
	I	II	III	I	II	III	I	II	III	I	II		
T1	5.66 (13.16)	14.33 (21.95)	28.33 (32.00)	5.66 (13.16)	8.33 (16.03)	6.66 (14.33)	17.66 (24.56)	12.33 (20.02)	20.00 (26.37)	11.33 (19.30)	5.66 (13.30)	12.36	45.09
T2	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	3.66 (10.48)	9.33 (17.26)	2.33 (7.02)	5.66 (13.30)	7.66 (15.56)	15.66 (23.00)	11.33 (19.30)	8.66 (16.51)	5.84	74.05
T3	8.00 (15.75)	16.33 (23.58)	27.33 (31.38)	6.33 (13.97)	10.66 (18.42)	15.33 (22.83)	27.33 (31.36)	8.66 (16.47)	12.66 (20.42)	10.33 (18.20)	7.33 (15.26)	13.66	39.31
T4	3.66 (10.48)	7.33 (15.29)	18.33 (25.01)	4.66 (12.03)	7.66 (15.56)	5.33 (12.70)	9.66 (17.56)	12.33 (20.10)	21.33 (27.28)	16.00 (23.33)	9.33 (17.31)	10.51	53.31
T5	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	2.66 (7.69)	5.33 (12.49)	11.33 (19.30)	19.33 (25.85)	22.66 (28.25)	15.33 (22.70)	10.33 (18.16)	7.91	64.86
T6	0.00 (0.00)	5.33 (12.84)	10.33 (18.31)	4.66 (12.03)	12.33 (20.24)	9.66 (17.63)	16.00 (23.33)	6.33 (14.20)	10.66 (18.62)	17.66 (24.55)	5.33 (12.84)	8.93	60.33
T7	6.33 (14.09)	18.66 (25.24)	24.33 (29.35)	32.33 (34.40)	26.66 (30.91)	38.33 (37.97)	34.00 (35.45)	27.33 (31.32)	18.33 (24.95)	13.66 (21.29)	7.66 (15.60)	22.51	
S.Em. (±)	-	2.30	2.55	2.39	2.91	3.28	3.74	3.08	3.11	3.05	3.05	2.94	
C. D. $_{0.05}$	-	5.79	6.44	6.02	7.34	8.27	9.42	7.77	7.83	NS	NS	NS	

Figures in parenthesis are logarithmic transformed value

Table 4.
Efficacy of different insecticidal treatments schedule against aphid on brinjal during 2011

Treatment schedule	Population of the pest on different dates of observation											Mean	% decrease over control
	July			August			September			October			
	I	II	III	I	II	III	I	II	III	I	II		
T1	5.66	18.33	38.66	8.66	13.33	6.33	15.33	11.33	19.00	14.66	7.33	14.42	54.15
	(13.25)	(25.07)	(38.26)	(16.47)	(21.01)	(14.20)	(22.79)	(19.30)	(25.69)	(22.19)	(15.19)		
T2	0.00	0.00	6.33	11.66	23.33	8.33	15.66	9.66	14.33	10.33	5.00	9.51	69.79
	(0.00)	(0.00)	(13.97)	(19.60)	(28.63)	(16.37)	(23.09)	(17.63)	(21.76)	(18.31)	(12.37)		
T3	7.66	16.33	35.33	8.33	15.66	28.66	42.33	14.33	20.33	15.66	8.33	19.36	38.44
	(15.60)	(23.58)	(36.27)	(16.37)	(22.94)	(30.14)	(40.49)	(21.93)	(26.50)	(23.09)	(16.17)		
T4	0.00	8.66	17.66	4.33	9.33	5.66	11.66	16.00	24.33	17.33	10.33	11.39	63.78
	(0.00)	(16.65)	(24.55)	(11.51)	(17.31)	(13.25)	(19.63)	(23.33)	(29.38)	(24.38)	(18.31)		
T5	0.00	0.00	5.33	0.00	0.66	3.66	9.33	12.33	20.33	13.66	8.66	6.72	78.63
	(0.00)	(0.00)	(12.84)	(0.00)	(2.71)	(10.76)	(17.31)	(20.24)	(26.35)	(21.21)	(16.47)		
T6	3.00	8.66	15.33	10.66	20.66	14.33	23.66	7.33	14.33	11.00	6.66	12.33	60.79
	(9.73)	(16.51)	(22.79)	(18.78)	(26.74)	(21.93)	(28.66)	(15.26)	(21.93)	(18.99)	(14.28)		
T7	8.33	17.33	32.33	40.33	49.00	61.66	53.66	34.33	22.33	16.66	10.00	31.45	
	(16.37)	(24.32)	(34.37)	(39.32)	(44.42)	(51.91)	(47.17)	(35.57)	(27.85)	(28.02)	(17.98)		
S. Em.(±)	1.46	2.35	3.22	2.74	2.92	2.61	3.07	2.66	2.89	2.42	2.59		
C. D. $_{0.05}$	3.68	5.92	8.11	6.92	7.37	6.58	7.75	6.70	NS	NS	NS		

Figures in parenthesis are logarithmic transformed value

Table 5.
Cost effectiveness of different insecticidal treatments schedule against aphid and whitefly on brinjal during 2010

Treatments	Marketable yield (t/ha)	Increased yield over control (t/ha)	Added benefit over control (Rs./ha)	Cost of treatment (Rs/ha)	Net profit (Rs/ha)	CBR
T_1	13.89	5.51	52896	4590	48306	1: 10.52
T_2	12.25	3.87	37152	1759	35393	1: 20.12
T_3	12.68	4.30	41280	1900	39380	1: 20.73
T_4	11.68	3.30	31680	1470	30210	1: 20.55
T_5	10.87	2.49	23904	2961	20943	1: 7.07
T_6	13.28	4.90	47040	8812	38228	1: 4.34
T_7	8.38	-	-	-	-	-

Selling price of brinjal= Rs. 9,600 per ton

Table 6.
Cost effectiveness of different insecticidal treatments schedule against aphid and whitefly on brinjal during 2011

Treatments	Marketable yield (t/ha)	Increased yield over control (t/ha)	Added benefit over control (Rs./ha)	Cost of treatment (Rs/ha)	Net profit (Rs/ha)	CBR
T_1	14.28	6.46	56848	4590	52258	1: 11.38
T_2	11.74	3.91	34408	1759	32649	1: 48.56
T_3	13.32	5.49	48312	1900	46412	1: 24.43
T_4	11.83	4.00	35200	1470	33730	1: 22.94
T_5	10.74	2.91	25608	2961	22647	1: 7.65
T_6	13.48	5.65	49720	8861	40859	1: 4.61
T_7	7.83	-	-	-	-	-

Selling price of brinjal= Rs. 8,800 per ton