Effectiveness of pheromone trap as IPM practice for BSFB affected fruits in Brinjal

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Abstract: An experiment was conducted in two locations (L1=Islampur and L2=Gafargaon) to evaluate the effectiveness of IPM practices for management of brinjal fruit and shoot borer (BSFB) in terms of number of affected fruits in different days after transplanting (DAT), total yield and cost benefit ratio (BCR). The experimental treatments were T_1 = Pheromone trap + Sanitation + Bio-control agent release, T_2 = Barrier cropping (Dhonia/Til) + Perching, T_3 = Pheromone trap + Spraying of Tracer, T_4 = Spraying of insecticide (Cartap) + Clean cultivation and T_5 = Control (farmers' practices) with three replications followed by randomized complete block design (dispersed). Results showed that the maximum total yield of brinjal (34.09 t ha^{-1}) and BCR (4.00) were found in Gafargaon and the minimum (31.16 tha^{-1}) and BCR (3.66) in Islampur. In case of treatment effect the highest total yield of brinjal (50.62 t ha^{-1}) and BCR (5.81) were found from treatment T_1 and the lowest yield (20.72 tha^{-1}) and BCR (2.50 t ha^{-1}) were from treatment T_5. In case of interaction (location × treatment) effect the highest total yield (52.10 t ha^{-1}) and BCR (5.98) were found in Gafargaon × treatment T_1 and the lowest yield (20.27 t ha^{-1}) and BCR (2.45 t ha^{-1}) found in Islampur × treatment T_5. Incase of maximum yield and BCR the affected fruits were minimum (22.27, 12.83 and 12.67) in numbers at 135 DAT.
Key words: Effectiveness, pheromone trap, IPM, BSFB and brinjal.

Introduction

Brinjal (*Solanum melongena* L) is an important vegetable for Bangladesh. It is widely cultivated throughout the country as a year round available vegetable. Pest specially brinjal shoot and fruit borer (BSFB) is a great problem to cultivate brinjal. It creates a serious problem in brinjal cultivation. Farmer sprays insecticides to control this pest in very careless manner and sometimes its frequency stands up to 80 times in a growing season (Anonymous, 1994). Integrated pest management (IPM) technology for brinjal is tested at field level and widely adapted. Brinjal is an important component in the existing cropping systems commonly practiced in Mymensingh and Jamalpur districts. The crop is grown extensively in these two districts. But yet, the IPM technologies have not been adopted or tested in the brinjal growing areas in Mymensingh and Jamalpur districts. Gafargaon of Mymensingh district and Islampur of Jamalpur district have the two most important commercial locally popular brinjal varieties namely Bholanath in Gafargaon and Bottle in Islampur. In fact, the morphology and other genetical characteristics of these two varieties are almost same. IPM in general, aims to change the farmers' practices to grow healthy and organic brinjal for increasing the farm output and farmers income on a sustainable basis while improving the environment and community health. Brinjal is one of the most popular and year round vegetable crops cultivated widely all over Bangladesh. It covers about 15% of the total vegetable area of the country and produced 1.6 million tons per year (Anonymous, 2001). About 98% farmers depend on the use of pesticides against BSFB. Spraying frequency was 140 times or more in the 6-7 months cropping season and contributed to 32% of total cost of production (Alam *et al.,* 2006). Pesticide causes different complications such as pesticide resistance, pest resurgence and environmental pollution. The use of quality pesticide and its proper management is a burning issue in respect of agro-socio-economic and environmental aspect (Moniruzzaman *et al*., 2008). The present study was undertaken for comparing the conventional and IPM technology in controlling brinjal shoot and fruit borer in the farmer's field of Gafargaon and Islampur.

Materials and Methods

Two locations (Gafargaon of Mymensingh district and Islampur of Jamalpur district) were taken in the farmer's field for the study. The experimental treatments viz., T_1 = Pheromone trap + Sanitation + Bio-control agent release, T_2 = Barrier cropping (Dhonia/Til) + Perching, T_3 = Pheromone trap + Spraying of Tracer, T_4 = Spraying of insecticide (Cartap) + Clean cultivation and T_5 = Control (farmers' practices) with three replications were accumulated in Randomized complete block design. The unit plot size was 1 bigha and the total no. of experimental plots was: $2 \times 5 \times 3 = 30$. The spacing of transplanting of plant was 75cm×60cm. Data were taken in the following parameters viz., no. of affected plants, no. of unaffected plants, no. of affected shoots, total yield in t ha^{-1} and BCR. General cultural practices were followed for brinjal cultivation (e.g., BARI recommended fertilizer dose, weeding, irrigation, etc.) except IPM practices. Effectiveness of brinjal IPM technology developed and recommended by AVRDC-BARI scientists have been tested using a participatory approach. Two groups of brinjal growers were organized – one group in Gafargaon and the other group in Islampur; each group comprised of 15 (i.e., 12 IPM +3 control) brinjal growers and each grower having one bigha of land planted to brinjal. The selected growers were motivated and trained on IPM production practices. They were also trained on record keeping and simple data collection on insect pest infestation, yield etc. Same variety of brinjal for two locations was used in the study which are called Bottle in Islampur and Bholanath in Gafargaon and that was locally very popular. Pest incidence in individual plot has been recorded and comparison made between the two groups management practices and within the treatments. Yield, production, and economic return of brinjal in each plot have been recorded in consultation with the participating growers. Two groups of farmers following different pest management practices have made treatment variables while each individual farmer has treated as a replication. All farmers have followed uniform production practices excepting pest management. In order to avoid spill over effect of IPM, the plots of different treatments have been setup quite apart from one another. 10 m^2 areas were taken for sample data collection. 4 samples area were taken in

each farmers plot. Each 10 m^2 areas, on an average 22 no. of plants were found. All the data were taken from that sample area and calculated to find out its mean. Data were taken at 15 days interval from 30 to 135 DAT. In case of yield calculation total yield of 8 interval data were summated and converted into t ha^{-1}. BCR were calculated treatment wise. All the collected data were analyzed following standard statistical procedure and differences among treatment means were adjudged by DMRT (Gomez and Gomez, 1984).

Results and Discussion

Number of affected fruits in different dates: The no. of affected fruits was chronologically increased from 30 DAT to 135 DAT among the location, treatment and combined effect. In case of location, maximum no. of affected fruits (22.27) at 135 DAT were found from L2 (Gafargaon) and minimum (0.00) from L1 & L2 at 30 & 45 DAT, in case of treatment effect maximum no. of affected fruits (27.50) were found from T5 at 135 DAT and minimum (0.00) from T1 through T5 at 30 & 45 DAT and in case of interaction effect maximum no. of affected fruits (33.00) were found from L2T5 at 135 DAT and minimum (0.00) from L1T1 through l2T5 at 30 & 45 DAT which all were not significantly influenced (Tables 1-3).

Total yield and BCR: The highest total yield (34.09 t ha^{-1}), BCR (4.00) were found from L2 and the lowest yield (31.16 t ha^{-1}), BCR (3.66) , in case of treatment effect maximum wt. of total fruits (10.30 kg) were found from T1 and minimum (0.00 kg) from T1 through T5 at 30 & 45 DAT, the highest yield (50.62 t ha^{-1}), BCR (5.81) were found from T1 and the lowest yield (20.72 t ha^{-1}), BCR (2.50 t ha^{-1}) found from T5 and in case of interaction effect maximum wt. of total fruits (52.10 t ha-1) were found from L2T1 and minimum (0.00 kg) from L1T1 through L2T5 at 30 to 45 DAT the highest yield (52.10 t ha^{-1}), BCR (5.98) were found from L2T1 and the lowest yield (20.27 t ha^{-1}), BCR (2.45 t ha^{-1}) found from L1T5 which were not significantly influenced (Tables 1-3).

Table 1. No. of affected fruits recorded in different dates at the two locations

Location	No. of affected fruits								Total yield t/ha	BCR
	30 DAT	45 DAT	60 DAT	75 DAT	90 DAT	105 DAT	120 DAT	135 DAT		
Islampur	0.00	0.00	2.00	4.87	7.07	10.33	13.20	18.40	31.16	3.66
Gafargaon	0.00	0.00	2.80	4.07	10.13	12.33	18.73	22.27	34.09	4.00
Sig.	NS	NS	**	**	**	**	**	**	**	NS
CV(%)	0.00	0.00	26.96	17.29	19.53	13.47	14.91	12.28	11.65	13.38

Table 2. No. of affected fruits recorded in different dates in various treatments

Treatment	No. of affected fruits								Total yield t/ha	BCR
	30 DAT	45 DAT	60 DAT	75 DAT	90 DAT	105 DAT	120 DAT	135 DAT		
T1	0.00	0.00	1.33c	3.00c	5.00c	7.50c	9.67d	12.83c	50.62a	5.81a
T2	0.00	0.00	3.50a	5.67b	10.00b	12.00b	16.67b	21.17b	29.03c	3.54c
T3	0.00	0.00	2.00bc	3.17c	5.50c	8.67c	13.50c	15.67c	38.98b	4.40b
T4	0.00	0.00	2.50b	3.50c	9.83b	12.83b	16.83b	24.50a	23.77d	2.90d
T5	0.00	0.00	2.67b	7.00a	12.67a	15.67a	23.17a	27.50a	20.72d	2.50d
Sig.	NS	NS	**	**	**	**	**	**	**	**
CV(%)	0.00	0.00	26.96	17.29	19.53	13.47	14.91	12.28	11.65	13.38

T1 = Pheromone trap + Sanitation + Bio-control agent release; T2 = Barrier cropping (Dhonia/Til) + Perching; T3 = Pheromone trap + Spraying of Tracer; T4 =S praying of insecticide (Cartap) + Clean cultivation; and T5= Control (farmers' practices)

Table 3. Interaction effect of treatment and location on no. of affected fruits in different dates

Interaction L×T	No. of affected fruits								Total yield t/ha	BCR
	30 DAT	45 DAT	60 DAT	75 DAT	90 DAT	105 DAT	120 DAT	135 DAT		
L1T1	0.00	0.00	1.00	3.33	4.67e	7.67	9.67e	12.67e	49.13	5.64
L1T2	0.00	0.00	2.67	6.00	7.00de	9.00	12.67de	19.67cd	28.73	3.50
L1T3	0.00	0.00	1.67	3.33	5.33de	9.33	12.67de	15.00e	35.80	4.04
L1T4	0.00	0.00	2.33	3.67	8.00cd	11.00	12.67de	22.67bc	21.87	2.67
L1T5	0.00	0.00	2.33	8.00	10.33bc	14.67	18.33bc	22.00bc	20.27	2.45
L2T1	0.00	0.00	1.67	2.67	5.33de	7.33	9.67e	13.00e	52.10	5.98
L2T2	0.00	0.00	4.33	5.33	13.00ab	15.00	20.67b	22.67bc	29.33	3.58
L2T3	0.00	0.00	2.33	3.00	5.67de	8.00	14.33cd	16.33de	42.17	4.75
L2T4	0.00	0.00	2.67	3.33	11.67b	14.67	21.00b	26.33b	25.67	3.13
L2T5	0.00	0.00	3.00	6.00	15.00a	16.67	28.00a	33.00a	21.17	2.55
Sig.	NS	NS	NS	NS	**	**	**	**	NS	NS
CV(%)	0.00	0.00	26.96	17.29	19.53	13.47	14.91	12.28	11.65	13.38

In a column, figures with same letters or without letters do not differ significantly as per DMRT, NS =Not significant, L1= Islampur and L2= Gafargaon
** Significant at 1% level of probability

It might be due to maximum number of affected plants, minimum number of unaffected plants and higher number of affected shoots and fruits in different DATs. This is very encouraging results for organic and profitable brinjal cultivation that are agreed to Alam, *et al.* 2008. The significant test between the experimental plots and farmers' plots indicated that the IPM technologies performed much better results. However, the farmers in the study areas were very enthusiastic about the IPM technologies for brinjal (Moniruzzaman *et al*., 2008). Brinjal IPM significantly contributes to high farm production costs, quality and yields (Henneberry, *et al*. 1991). All these results are supported to Kabir *et al*., 2010.

It is concluded that from the first year findings from the location, the maximum brinjal fruit yield (34.09 t ha^{-1}) and BCR (4.00) were found from L2 (Gafargaon) and the minimum brinjal fruit yield (31.16 tha^{-1}) and BCR (3.66) from L1(Islampur). In case of treatment effect the highest brinjal fruit yield (50.62 t ha^{-1}) and BCR (5.81) were found from treatment T1 and the lowest yield (20.72 tha^{-1}) and BCR (2.50 t ha^{-1}) were found from treatment T5. For interaction (location × treatment) effect the highest yield (52.10 t ha^{-1}) and BCR (5.98) were found from Gafargaon with the treatment T1 and the lowest yield (20.27 t ha^{-1}) and BCR (2.45 t ha^{-1}) found from Islampur with the treatment T5. Incase of maximum yield and BCR the affected fruits were minimum (22.27, 12.83 and 12.67) in numbers at 135 DAT.

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