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Assessment of Efficacy of Pheromone Trap to Control Fruit and Shoot Borer (*Leucinodes orbonalis* Guenee.) in Brinjal at Murshidabad District of West Bengal

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Abstract

An investigation was carried out on brinjal over three years, to assess the efficacy of pheromone trap for controlling the fruit and shoot borer (Leucinodes orboalis Guenee) in brinjal at Murshidabad District of West Bengal. The experiment was under taken in different adopted villages of the district. In this experiment pheromone trap were used @ 45 nos /ha (T_1) and @75 nos /ha (T_2) and compared with conventional practice (Control). The treatment replicated in 7 different farmers field.The result reveals that the farmers practice has the highest incidence of brinjal fruit and shoot borer (53.53%). T_1 (Use of pheromone trap 45/ ha) indicate incidence of 36.73% plant and T_2 (pheromone trap 75/ ha) has lowest incidence (34.87%). Therefore, the use of pheromone trap as well as need based spray of echo-friendly pesticide is quite effective to minimize the incidence of fruit and shoot borer of brinjal.

Key Words: Brinjal, fruit and shoot borer, IPM, pheromone trap.

Introduction

Among the vegetables grown in India, Brinjal (*Solanum melongena* Linn.) is one of the most important, it is also popular in South and South-East Asia (Thapa, 2010), where climate is hot and humid (Hanson *et al*., 2006). It belongs to the Solanacae family and is the one of most commercial vegetable of this family (Kantharajhaand Golegaonkar, 2004), and is a native of Indo-Pak subcontinent (Dunlop, 2006). A wide range of insect pests attack brinjal from its planting till to harvesting. Brinjal shoot and fruit borer (BSFB) (*Leucinodes orbonalis* Guenee) is one of the common pest of the crop which can destroy the crop, and lead to saviour economic loss of the crop (Chakraborti and Sarkar, 2011; Saimandir and Gopal, 2012) and is problem was reported from all brinjal producing countries (Dutta *et al*., 2011). It is considered as most dangerous insect pest of brinjal in Asia, especially in India, Pakistan,Sri Lanka, Nepal, Bangladesh, Thailand, Philippines, Cambodia, Laos, Vietnam (AVRDC, 1994), Africa, Sahara and South-East Asia (CABI,2007). It may causes up to 85 to 90 per cent yield losses of the crop (Dhankar, 1988; Raju *et al.,* 2007; Mishra, 2008, Jagginavar *et al*., 2009). Larva is the only damaging stage of this pest which feeds on the inner portion of the fruit and form large exit holes in the fruits for pupation after complete development due to this market value of the fruits will decrease and not remain fit for human consumptions (Alam *et al*., 2003).

Murshidabad district of West Bengal is well known for its vegetable production, due to its importance as a vegetable producing zone, the district included as one of the Agri Export Zone (AEZ) for vegetables crops. Though the district having tremendous opportunity of producing excellent quality brinjal, but producers often suffer hugeproduction loss of brinjal for its low quality and market price, this is

due to severe infestation of brinjal bruit and shoot borer. The producer used to apply various kinds of insecticides even in alternate day to get relief from the problem, but not achieved the success. Considering the field situation faced by the producers, the Krishi Vigyan Kendra Murshidabad planned to incorporate a non-chemical measure to minimize the infestation of fruit and shoot borer by using pheromone trap.

Materials and Method

Assessment of efficacy of use different numbers of pheromone traps under field condition was carried out at different adopted villages under 5 blocks in Murshidabad district of West Bengal under Murshidabad Krishi Vigyan Kendra, which were located at 24^0 16'10'' N latitude and $88^0$17'15'' E longitude, the study was carried out for 3 years, from 2016-2019.In this experiment,two bio-pesticides were used i.e. (E)-11-Hexadecimile acetate based pheromone trap in combination with need based spray of spinosad 45% SC @ 1ml l^{-1}.(Abdullah *et al*., 2014). In this experiment, 45 nos ha^{-1}pheromone trap along with clippings of infect branches/parts from the lower parts of the plant from the beginning and need based spray of spinosad 45 % SC at 45 DAT and 60 DAT (T_1) and @75 nos ha^{-1} along with clippings of infect branches/ parts from the lower parts of the plant from the beginning and need based spray of spinosad 45 % SC at 45 DAT and 60 DAT (T_2) and compared with conventional practice (Control) i.e. indiscriminateuse of pesticide even in alternate day. The trap was placed in zigzag pattern at 40 DAP and lure were replaced at 7 days interval.The treatments were replicated in 7 different farmers field and were evaluated following the Randomized Block Design (RBD). Each treatment was applied in individual plots, and the data were recorded from the selected sample at a random from the middle of the plots. The data was recorded on pest infestation as well as its effect on yield and yield components. The data collected from different characters were analyzed by the method of analysis of variance given by Gomez and Gomez (1984).

Results and Discussion

The data presented in Table 1, revealed that, average no of male moth trapped $week^{-1}$ was varied between 15.74 and 17.32. It was recorded that, average number of male moths trapped in the filed under treatment T_2 (where 75 traps ha^{-1}) were higher 17.32 $week^{-1}$ compared with T_1 (45 traps ha^{-1}) where only 15.74 moths were trapped $week^{-1}$). It was observed that, increase in the number of trap ha^{-1} average number of male moth captured was found to be increased, this may be due to increase number of pheromones attraction capacity from the nearby fields, which leads to higher moth capture per traps $week^{-1}$, this results is in the line with the observation of Mamun *et al*., 2014.

The average percentage of damage shoot was recorded 31.23 in fields with 75 traps ha^{-1} (T_2), followed by 32.34 per cent in T_1 compared with 42.62 per cent in farmers practice (T_3) Table 1. The percentage of fruit damage was also showed similar pattern i.e. maximum number of fruit damage was recorded in farmers practices (T_3), where as it was

Table 1. Effect of different treatments against brinjal fruit and shoot borer and its impact on yield and yield attributing characters

Treatment	Avg. No of male moth trapped $week^{-1}$	Shoot damage (%)	Fruit damage (%)	Pest incidence (%)	Yield (q ha^{-1})
T_1	15.74	32.34	27.34	36.73	226.67
T_2	17.32	31.23	24.34	34.87	230.45
T_3	0	42.62	52.23	53.53	175.36
SEm±	-	-	-	-	3.4354
CD at 5%	-	-	-	-	10.5849

recorded only 24.34 per cent in T_2 followed by 27.34 per cent in T_1. Similar observation was reported by Sumathi *et al*., 2018. Dutta *et al*. (2011) also observed that among the different IPM modules evaluated, mechanical removal of infested fruits and shoots + pheromone trap + need based use of neem was found as the most effective in reducing shoot damage (86.69%).

Percentage of fruit damaged due to infestation of fruit and shoot borer was varied between 24.34% and 52.23%. The incidence was recorded only 24.34 per cent in treatment T_2 i.e. 75 traps ha^{-1} followed by 27.34 per cent in T_1 and was recorded maximum 52.23 per cent in farmer practice (Control) Alam *et al*. (2003) reported that the marketable fruit yield was greater in pheromone treated plots than in check plots. Similar trend was also observed in the case of occurrence of pest in field. The pest incidence per cent was recorded only 34.87 per cent in T_2 followed by 36.73 per cent in T_1 and it was observed maximum 53.53 per cent in control (Table 1).

Average yield per hectare was varied between 175.36 q ha^{-1} and 230.45q ha^{-1}. The maximum yield was recorded 230.45 q ha^{-1}in T_2 followed by 226.67 q ha^{-1}in T_1 and it was recorded only 175.36 q ha^{-1}in T_3. Increase in marketable yield in pheromone treated plots was also reported by Alam *et al*. (2003).

The economic analysis was computed on the basis of existing prices of inputs, marketable yield of brinjal prevailing at the time of this study and presented in Table 2. It revealed that, the cost of production was highly influenced by use of pesticide (Control plots). Although the maximum estimated net return (Rs. 75881.67/-) was obtained with T_2 but the income per rupee investment increased with decrease of number of trap used per unit area, and it was recorded highest (2.72) when 45 nos ha^{-1} pheromone trap was used followed by75 nos. ha^{-1} pheromone trap used (2.66).

Chemical pesticides used in brinjal to kill the fruit and shoot borer, will also make harm to the beneficial insects. Which results in lowering the marketable yield due to less pollination. Thus pheromones play a significant role in insect pest management as well as in the enhancement of yield. So farmers must have a suitable lure and suitable trap to control the fruit and shoot borer of brinjal effectively.

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TABLE 2. Effect on cost of cultivation as well as cost benefit ratio due to implication of different treatments

Treatment	Cost of cultivation (Rs. ha^{-1})	Gross return (Rs ha^{-1})	Net return (Rs. ha^{-1})	BC ratio
T_1	43786.67	119456.67	75670.00	2.72
T_2	45543.33	121425.00	75881.67	2.66
T_3	50223.33	95054.33	44831.00	1.89
SEm ±	-	-	-	-
CD at 5%	-	-	-	-

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