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EFFECT OF PHEROMONE TRAP ON INCIDENCE OF BRINJAL SHOOT AND FRUIT BORER, *LEUCINODES ORBONALIS* GUEN.

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ABSTRACT

The eco-friendly insect-pest management consisting mass trapping through sex pheromone trap in different experiment field (Agronomy farm and Farmer's field) reported higher fruit yield with the lowest fruit damage compare to control area whereas Farmer's field reported highest yield (395.12 q/ha) and lowest shoot damage (8.42%) and fruit damage (6.51% and 6.29%) on number basis and weight basis, respectively. There was highly significant positive association between moth catches and shoot damage (r= 0.8241** and r= 0.7656**) as well as with fruit damage (r= 0.7153** and r= 0.7426**) from Agronomy farm and Farmer's field, respectively. The highest marketable fruit yield (395.12 q/ha) obtained in Farmer's field with higher per cent increase over control in both number (19.66%) and weight (22.67%) basis, respectively.

INTRODUCTION

Brinjal, *Solanum melongena* L. is one of the most commonly grown and economically important vegetables of Gujarat and shoot and fruit borer, *Leucinodes orbonalis* Guen. is the key insect limiting the production and productivity of this vegetable crop. Farmers are using variety of toxic insecticides more frequently and rampantly for control of this pest which has led to environmental pollution, disruption of natural enemies and health hazards. Use of pheromones is gaining importance for monitoring, mass trapping and mating disruption.

MATERIALS AND METHODS

Present investigation was carried out at Agronomical Instructional Farm as well as on Farmer's field and a control plot (without pheromone trap) kept in Horticultural Instructional Farm during kharif 2012. Lure

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Table 1. Per cent shoot infestation (weekly interval)

Experimental area	Weekly shoot infestation (%)											Mean shoot infestation (%)
	August			September				October				
	II	III	IV	I	II	III	IV	I	II	III	IV	
Agronomy farm (With pheromone trap)	16.13	20.00	15.49	13.16	11.11	11.88	9.32	5.06	3.66	1.35	0.50	9.79
Farmer's field (With pheromone trap)	13.33	21.88	14.29	10.78	8.54	9.04	5.96	4.44	3.18	0.95	0.21	8.42
Control area (Without pheromone trap)	16.67	27.78	33.33	28.21	14.58	16.12	13.59	13.01	8.86	4.18	0.80	16.10

Table 2. Per cent fruit infestation on number and weight basis (weekly interval)

Experimental area		Weekly fruit damage (%) on number and weight basis										Mean fruit tation-infes (%)
		October		November				December				
		IV	V	I	II	III	IV	I	II	III	IV	
Agronomy farm (With pheromone trap)	Number basis	13.33	10.00	16.67	12.12	10.81	9.62	8.96	5.55	4.35	0.00	9.14
	Weight basis	13.17	9.90	16.51	12.01	10.77	9.61	8.96	5.45	4.34	0.00	9.07
Farmer's field (With pheromone trap)	Number basis	7.14	8.33	10.71	9.09	8.06	7.35	6.25	4.35	3.85	0.00	6.51
	Weight basis	7.11	7.97	10.55	9.04	8.01	5.85	6.21	4.32	3.86	0.00	6.29
Control area (Without pheromone trap)	Number basis	18.75	16.67	18.92	28.28	23.53	21.28	17.19	14.29	6.67	0.00	16.62
	Weight basis	18.52	16.67	21.47	28.70	23.77	21.28	18.64	14.13	6.74	0.00	16.99

was replaced at every 30 days interval. The population of *L. orbonalis* was mass trapped (50 traps/ha) through sex pheromone traps was installed in 20m × 20m plot at Agronomical Instructional Farm and farmer's field (18m × 24m plot). Observations were taken from 10 DAT (Days After Transplanting) of crop. The moths were killed after each counting. Shoot damage on 10 randomly selected plants was recorded from sex pheromone installed plot and in controlled plot. Fruit damage on number and weight basis at each picking from five spots of 1m × 1m (four plants/spot) area were recorded. Data were statistically analyzed. Marketable fruit yield were also recorded.

RESULTS AND DISCUSSION

The data on per cent shoot damage due to *L. orbonalis* in weekly interval are presented in Table 1 where Agronomy farm and Farmer's field recorded lower shoot infestation (9.79% and 8.42%) as compared to control area (16.10%) which shows effective performance of pheromone trap. The data of mean per cent fruit damage are presented in Table 2 shows lower fruit damage on number as well as weight basis (9.14%, 6.51% and 9.07%, 6.29%) due to *L. orbonalis* recorded from Agronomy farm and Farmer's field as compared with control area (16.62% and 16.99%), respectively. Similar results have been reported by Chatterjee, 2009.

The data on moth catches of *L. orbonalis* as well as damage to shoot and fruit recorded at weekly interval are presented in Table 3 & 4. Since the male moths were trapped continuously after 10 days of transplanting, it caused appreciable mating disruption resulting into reduction in damage to shoot during growth period. There was highly significant positive correlation between moth catches and shoot damage in Agronomy farm (r=0.8241**) as well as Farmer's field (r=0.7656**). As the shoot damage increase, the moths

Table 3. Number of moths caught through the pheromone traps and shoot infestation due to *L. orbonalis*

Shoot damage Months & Weeks	SMW	With pheromone trap					Control area (Without pheromone trap)
		Agronomy farm		Farmer's field			
		No.of moths trapped/ trap/week	Average shoot damage (%)	No. of moths trapped/ trap/week	Average shoot damage (%)	Average shoot damage (%)	
1		2	3	4	5	6	7
July	V	31	1.0	0.00	1.0	0.00	0.00
August	I	32	1.0	0.00	0.5	0.00	0.00
	II	33	1.5	16.13	1.0	13.33	16.67
	III	34	2.5	20.00	2.0	21.88	27.78
	IV	35	2.0	15.49	1.5	14.29	33.33
September	I	36	1.5	13.16	1.0	10.78	28.21
	II	37	2.0	11.11	1.0	8.54	14.58
	III	38	2.0	11.88	1.5	9.04	16.12
	IV	39	1.5	9.32	0.5	5.96	13.59
October	I	40	1.0	5.06	1.0	4.44	13.01
	II	41	1.0	3.66	1.0	3.18	8.86
	III	42	1.0	1.35	0.5	0.95	4.18
	IV	43	1.5	0.50	1.0	0.21	0.80
				r = 0.8241**		r= 0.7656**	

Note: 1: *: Significant at 5 % level, **. Significant at 1% level 2: SMW: Standard Meteorological Week

Table 4. Number of moths caught through the pheromone traps and fruit infestation due to *L. orbonalis*

Fruit damage Months & Weeks	SMW	With pheromone trap					Control area (Without pheromone trap)
		Agronomy farm		Farmer's field			
		No.of moths trapped/ trap/week	Average Fruit damage (%)	No. of moths trapped/ trap/week	Average Fruit damage (%)	Average Fruit damage (%)	
1		2	3	4	5	6	7
October	IV	43	1.5	13.33	1.0	7.14	18.75
	V	44	0.5	10.00	1.0	8.33	16.67
November	II	45	1.5	16.67	1.5	10.71	18.92
	III	46	1.0	12.12	1.0	9.09	28.28
	IV	47	1.0	10.81	1.5	8.06	23.53
	V	48	0.5	9.62	1.0	7.35	21.28
December	I	49	1.0	8.96	0.5	6.25	17.19
	II	50	1.0	5.55	1.0	4.35	14.29
	III	51	0.5	4.35	0.5	3.85	6.67
	IV	52	0.5	0.00	0.5	0.00	0.00
				r = 0.7153**		r= 0.7426**	

Note: 1: *: Significant at 5 % level, **. Significant at 1% level 2: SMW: Standard Meteorological Week

Table 5. Effect of pheromone trap on fruit damage and its impact on brinjal yield

Treatments	Average percent of Fruit damage		Marketable yield			Percent yield increased over control	
	Number basis	Weight basis	No./m^2 (1m×1m)	kg/m^2 (1m×1m)	q/ha	Number basis	Weight basis
1	2	3	4	5	6	7	8
Agronomy farm (with pheromone trap)	9.14	9.07	79.2	380.33	380.33	14.14	19.66
Farmer's field (with pheromone trap)	6.51	6.29	84	395.12	395.12	19.05	22.67
Control area (without pheromone trap)	16.99	16.62	68	305.56	305.56	----	-----

Note:

1. Yield increased over control = Yield of treatment – Yield of control
2. Per cent yield increased over control = $\frac{\text{Yield of treatment} - \text{Yield of control}}{\text{Yield of treatment}} \times 100$

catch also increase and vice-versa. There was highly significant positive correlation between moth catches and fruit damage in both Agronomy farm (r= 0.7153**) as well as Farmer's field (r= 0.7426**). As the fruit damage increase the male moth catch increase and vice-versa but fruit infestation was comparatively lower than control area. Fruit infestation also reduce subsequent weeks in both pheromone allotted area comparatively control area.

The data on yield of brinjal fruits (q/ha) in different pheromone trap experiment field recorded higher fruits yield (380.33 q/ha and 395.12 q/ha) than control area (305.56 q/ha) presented in Table 5. However, Farmer's field yielded highest fruit yield than the control area. The highest per cent increase in yield over control was obtained in Farmer's field (19.05% & 22.67%) followed by Agronomy farm (14.14% & 19.66%) on number and weight basis, respectively. Thus, the effect of pheromone trap was also reflected on damage to fruits and thereby on yield of healthy fruits. Alam et al., 2003 observed marketable fruit yield was higher in pheromone installed field than control field with less fruit damage.

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