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A note on the Efficiency of Different Pheromone Traps in Monitoring *Helicoverpa (Heliothis) armigera* (Hb.) Males

The cotton bollworm, *Helicoverpa (Heliothis) armigera* (Hb.), a polyphagous pest is causing considerable damage to the crops. The sex pheromones are identified as one of the effective and ecologically safe components of integrated pest management. The monitoring strategy through pheromone traps are found reliable for the detection and estimation of adult populations of *H. armigera*. Much emphasis is being laid on pheromone traps and their effectiveness in trapping different adult insects and appreciated by their capturing performance by many workers (Pawar *et al.* 1982; 1987). The studies made by Balasubramanian *et al.* (1985) and Chari *et al.* (1985) on pheromone trap baited with one mg of a mixture of the synthetic sex pheromones [(Z) - 11 - hexadecenal and (Z) - 9 - hexadecenal in the ratio of 97 : 3] are indicated to be more reliable for monitoring populations of this insect. Keeping in view of the effectiveness of the sex pheromone lure, an attempt is made to study the efficiency of different types of sex pheromone traps in trapping male population of *H. armigera*.

Different types of pheromone traps, viz. ICRISAT standard trap, Delta trap, Wing

trap/IC pherocone trap, oil board trap, polythene sleeve trap and water pan trap were evaluated for their performance in trapping *H. armigera* at Main Research Station, Dharwad and Agricultural Research Station, Annigeri, Karnataka during 1987-88. Rubber septa containing 1 mg. loaded sex pheromone were suspended at the centre of each trap and they were changed once in 20 days. The traps were hung to the poles at the crop canopy height in cotton field in a completely randomised block design with four replications. Traps were placed at 150 m apart in the cotton field. The number of male moths captured in each trap was counted and destroyed at weekly intervals.

The data thus collected was pooled and transformed into log (x + 1) values for statistical analysis.

Maximum number of male moths (92.37 and 31.37 moths per week) were found in ICRISAT type trap followed by polythene sleeve trap (27.87 and 26.75 moths per week) during the period of study at Main Research Station, Dharwad and Agricultural Research Station, Annigeri, respectively. The relative performance of different traps clearly indicated

the superiority of ICRISAT standard trap ($p = 0.05$) over other pheromone traps (Table 1) at both the places of study. Further, it also accounted for 54.77 and 37.13 per cent of total moth capture of male moths at Dharwad and Annigeri, respectively. Next to this, maximum number of *H. armigera* was found in polythene sleeve trap and water pan trap. The other types of traps tested, viz. Wing trap, Delta trap and oil board trap were proved to be unsuitable for capturing *H. armigera* as they failed to attract appreciable number of *H. armigera*, moths under similar conditions. The results obtained from both stations were almost similar (Table 1). The present results are in line with the report of Bourdouxhe (1982) wherein the sticky trap was found to be inefficient in capturing *H. armigera* as

compared to water trap. Pawar *et al.* (1982; 1984; 1987) also reported similar results when they compared polythene sleeve trap with U.S.A. traps and wind vane traps and inverted and metallic versions of the standard trap and two modified polythene sleeve traps. However, they have not compared wing trap, delta trap, oil board trap, water pan trap with the ICRISAT standard trap or polythene sleeve trap. Based on the present results, it is suggested to use ICRISAT standard pheromone trap for monitoring and mass trapping of *Heliothis* bollworm, *H. armigera*.

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Table 1. Total number of *Heliothis armigera* (Hb.) males caught in different pheromone traps

Traps	Number of males caught at					
	Dharwad			Annigeri		
	Total	Mean	Percent of total moths captured	Total	Mean	Percent of total moths captured
ICRISAT Standard trap.	659 (13.48)*	82.37 (1.685)	54.77	251 (10.41)	31.37 (1.301)	37.13
Delta trap	46 (5.58)	5.75 (0.697)	3.82	37 (4.77)	4.62 (0.596)	5.47
Wing trap.	50 (6.23)	6.25 (0.778)	7.98	51 (5.26)	6.37 (0.657)	10.05
Oil board trap	9 (2.14)	1.12 (0.267)	0.75	7 (1.67)	0.8 (0.208)	1.03
Polythene sleeve trap	223 (10.75)	27.87 (1.343)	18.53	214 (9.38)	26.75 (1.172)	31.65
Water pan trap	170 (9.73)	21.25 (1.216)	14.13	99 (7.85)	12.37 (0.981)	14.64
S. Em (\pm)		0.134			0.132	
C. D. (at 5%)		0.462			0.456	

* Figures in parenthesis are $\log(x + 1)$ transferred values.

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Role of Planting Time and Insecticides in the Management of Potato Tuber Moth

The potato tuber moth (PTM), *Phthorimaea operculella* Zell, an economically important pest of potato, is reported to cause severe damage to crop in the field and 30 to 70 per cent damage to the tuber in store (Sexana, 1974). To combat this pest, several cultural methods such as deep planting, sanitation, water management, earthing up of the crop, early planting, and several insecticides have been tried (Williams and Dove, 1971; Gubbaiah and Thontadarya, 1975; Shelton and Wyman, 1979; and Shaheen, 1983).

The present studies aimed to assess the effect of sowing dates and insecticides in the management of PTM, were carried out at Agricultural Research Station, Madenur, Hassan during 1984-86. The experiment was laid out in split plot design using Kufri Badshah variety. The main plots differed in insecticidal application while the subplots differed in date of sowing as indicated in Table 1. The treatments were replicated six times. All other package of practices were followed to raise the crop. The effects of sowing dates and insecticidal