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Monitoring of Spotted Bollworm Moths with Sex Pheromone Traps and its Relationship with Field Incidence*

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Sported bollworms, *Earias* spp. (Noctuidae : Lepidoptera) are important potential pests of cotton. Two species of the pest i.e. *Earias vittella* (Fab.) and *Earias insulana* (Boisd.) are found attacking cotton crop. Kehat and Bar (1975) made first attempt to monitor the population of *E. insulana* in cotton fields, with the use of traps baited with virgin females. (E, E) — 10, 12-Hexadecadienal was indetified as a component of the sex pheromone of female *E. insulana* (Hall *et al.*, 1980). Synthetic pheromone traps have been reported to be a good tool in monitoring of *Earias* population (El-Mosa, 1986). Information on the seasonal activity of spotted bollworm moths using sex pheromone is very meagre. No successful attempt has been made to monitor the pest in Dharwad region of Karnataka State except the work of Naik (1988). Hence, the present study was undertaken to fill up the lacunae and to promote the research in this direction.

Seasonal activity of spotted bollworm moths was studied by using sex pheromone traps at two different locations i.e. at the Main Research Station (MRS), Dharwad and Agricultural Research Station (ARS), Dharwad, Karnataka. Minotoring of moths was done during entire cotton growing seasons in 1989-90 and 1990-91. Polythene sleeve traps baited with 1.2 mg sex pheromone/lure (Plastic vial) were used to monitor the pest.

Such pheromone traps were installed in general cotton field (Variety DS-28) at MRS, Dharwad and in the experimental area of different discipline at ARS, Dharwad. Five pheromone traps were operated during both the seasons of study, except during 1989-90, where only 4 pheromone traps were operated at the ARS, Dharwad. The traps were placed at 15 cm above the crop canopy as suggested by Dhawan and Sidhu (1987), and this height was maintained by raising the trap frequently as the crop grew. The minimum distance between two traps was 30 to 40 metres. Lures were replaced at 20 days interval. A small cotton plug with few drops of dichlorvos (DDVP) was placed at the bottom of polythene sleeve traps to kill the trapped moths. The number of moths trapped was recorded daily in the morning and the trap was emptied.

The observations were made at weekly interval by picking 50 green bolls randomly

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TABLE 1

Correlation coefficient (r) between pheromone trap catches of *Earias* spp. and larval population and field incidence on cotton bolls.

Correlated weeks	*Larval population*			*Field incidence*		
	1989-90	*1990-91*		*1989-90*	*1990-91*	
	ARS	*MRS*	*ARS*	*ARS*	*MRS*	*ARS*
Three weeks before trap catch	–0.920**	–0.460	–0.247	–0.997**	–0.711**	–00.364
Two weeks before trap catch	–0.710*	–0.157	+0.085	–0.654*	–0.144	–0.012
One week before trap catch	–0.423	–0.157	+0.400	–0.479	+0.263	+0.374
During the same week of trap catch	+0.348	+0.536	+0.635*	+0.231	+0.463	+0.645*
One week after trap catch	+0.669*	+0.776**	+0.858**	+0.687*	+0.655*	+0.808**
Two weeks after trap catch	+0.564	–0.037	+0.697**	+0.614	+0.383	+0.723**
Three weeks after trap catch	+0.231	–0.269	+0.409	+0.293	–0.335	+0.509
Four weeks after trap catch	+0.248	–0.085	+0.002	+0.310	–0.303	+0.075

** 1% level of significance.
* 5% level of significance.

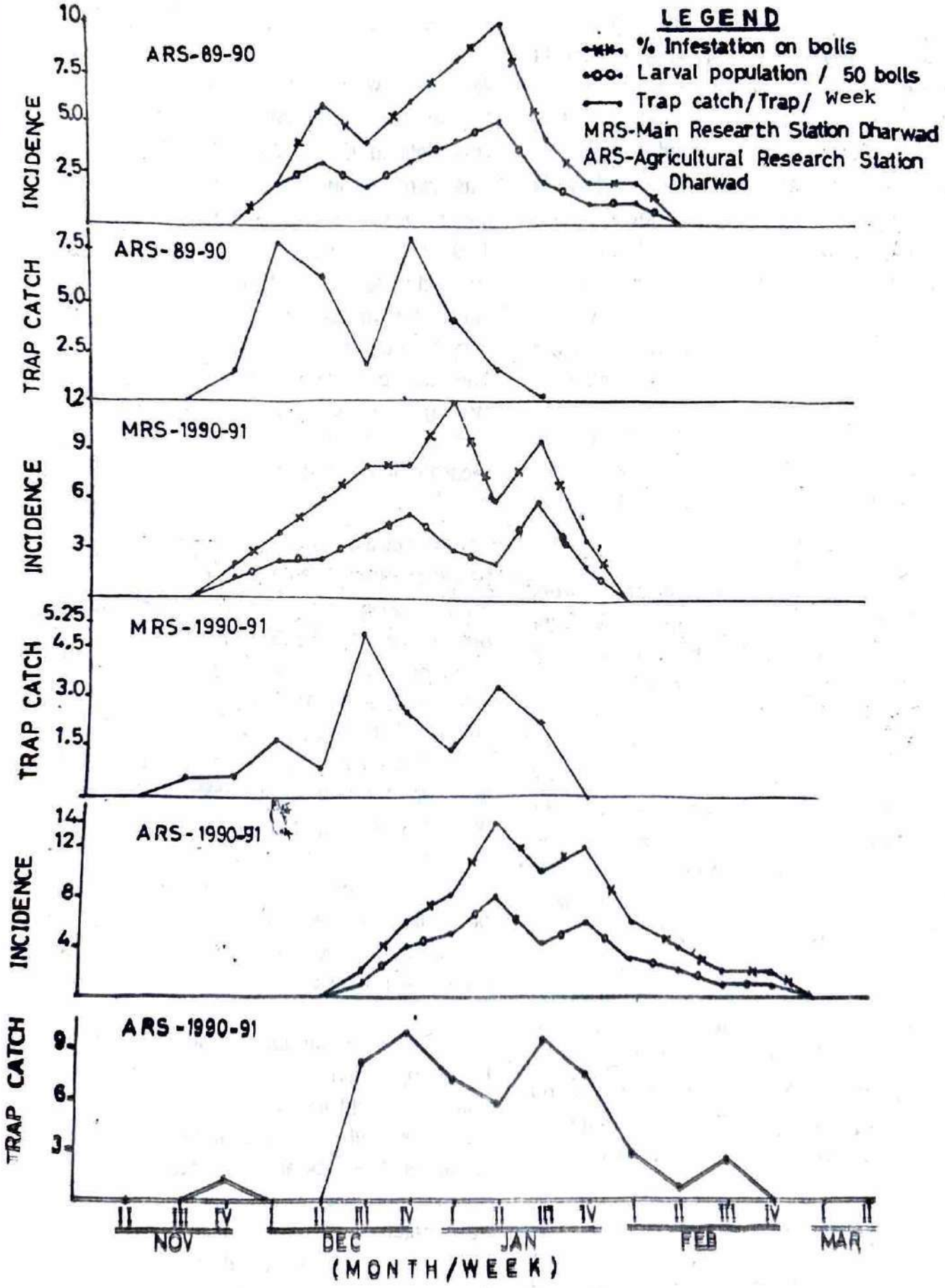

Fig. 1 : Relationship between trap catches of *Earias* spp. and larval population and field incidence during 1989-90 and 1990-91.

from the field where the moth activity was monitored by pheromone traps. These bolls were observed for the presence of larvae and damage caused by them. An attempt was made to establish the relationship between trap catches, larval population and field incidence by correlating and regressing the larval numbers and damage level with trap catches during the same week, before trap catch upto three weeks and upto four weeks after trap catches. The correlation coefficient (r) values obtained are presented in Table 1.

The traps set in, both *E. insulana* and *E. vittella* were attracted. Hence, the results pertain to cummulative data of both the species.

The moth activity was observed from middle of November to third week of January during 1989-90 at MRS, Dharwad, while it continued till February third week at ARS, Dharwad during 1990-91. Thus, the major active period was found from November to February. These findings are correborated by the observations of Thontadarya *et al.* (1980) and Thangavelu (1982), who reported the active period from November to February. However, light trap studies from Dharwad revealed the activity of moths from April to December assuming major status from September last week to December last week (Patil and Devaiah, 1978), while in pheromone traps from August last week to February first week at Dharwad (Naik 1988), from second fortnight of September 1987 to first fortnight of February, 1988 at Raichur (Nandihalli *et al.*, 1990).

During 1989-90, trapping was not successful at MRS, Dharwad because of unknown reasons. However two major peaks at an interval of three weeks from the first in December first week were observed at ARS, Dharwad during 1989-90 and delayed appearance of these peaks by 2-3 weeks was noticed during 1990-91 (Fig.-1). There was variation in the number and timing of minor peaks between the two locations. This small variation in minor peaks is suspected to be due to less effectiveness of lures at moth density as no moths trapped despite the activity of moths in cotton fields. The above findings on number of peaks strikingly differed from the report of Patil and Devaiah (1978) and Naik (1988), who recorded four-five peaks in a year.

A positive significant correlation existed between trap catches and larval counts made during the same week ($r = 0.635^{*}$) one week ($r = 0.669^{*}$, 0.776^{**} and 0.858^{**}) and two weeks ($r = 0.697^{**}$) after trap catches (Table 1). These findings gain support from Kumar (1985) in the case of *E. vittella* on bhendi. Kehat and Bar (1975) also reported that adult peaks of *E. insulana* were followed by the appearance of larvae in the cotton field. Significant positive correlation established between larval population before trap catches and trapping of *E. vittella* by Naik (1988) contradicted the current results.

Since the damage in field is a function of larval population, the association between trap catch and field incidence followed the same trend as with larval population. The two variables have been correlated during the same week, one week and two weeks after trap catches. These observations are in conformity with the report of Planes Garcia (1955) who observed serious infestation of *E. insulana* after 20-25 days of peak catch.

Significant negative correlation between trap catch and larval population and field incidence recorded two and three weeks before trap catches at ARS during 1989-90, suggested that trap catch was not a reflection of larval activity in the study field much before trapping, instead was influenced by moths from nearly fields.

Results concluded that the spotted bollworm moths remained active from November to February. Positive and significant correlation existed between trap catch and larval numbers during the same week and up to two weeks after trap catches.Similar trend was noticed between trap catch and field incidence.

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