

## SEASONAL VARIATION OF MALE DIAMONDBACK MOTH CATCH IN PHEROMONE TRAP

N.CHANDRAMOHAN  
Horticultural Research Station  
Tamil Nadu Agricultural University  
Udhagamandalam 643 001



### ABSTRACT

Male diamondback moth catch in sex pheromone trap was noticed throughout the year in the Nilgiris. Trap catches were higher from April to July in 1990-91 and February to April during 1991-92. Weather elements cumulatively contributed of 16.34 per cent of variation in trap catch. Minimum temperature, relative humidity and total rainfall had negative influence on the trap catch. Positive correlation existed between field pupal population and pheromone catch.

**KEY WORDS :** Diamondback Moth, Pheromone, Trap Catch, Weather Elements.

The Diamondback moth (DBM), *Plutella xylostella* (L.) is an important pest of cruciferous crops enjoying worldwide distribution (CIE, 1967). The female sex pheromone of DBM was first isolated by Chow *et al.* (1974). Variation in the response of male adults to DBM pheromone was attributed to exo-and endogenous factors. Investigation on the exogenous variables encountered by DBM males are utmost important for utilisation of pheromone in pest management (Maa, 1986) In the present studies, investigations on the variation of DBM moths in pheromone trap during different periods and the influence of weather elements on moth catches are discussed.

### MATERIALS AND METHODS

Weekly male DBM catch to pheromone source was monitored from September 1990 to August 1992 at the Horticultural Research Station, Tamil Nadu Agricultural University, Udhagamandalam situated at 2300 m above mean sea level. DBM pheromone blend of cis-11-hexadecenal, cis-11-hexadecenyl acetate, and cis-11-hexadenol in the ratio of 5 :5:0.1 was used. A dose of 0.1 mg of pheromone blend was used on a rubber capsule. Four water pan traps were used and catches were recorded everyday at 9.00 am.

The influence of eight weather elements (Table 1) on moth catches in 106 standard weeks was correlated by multiple regression analysis. The mean weather elements of the week was correlated with corresponding mean weekly trap catches of the male moths. Simple correlation was made between the DBM pupal population with weekly trap catch. Mean number of pupae per plant was

arrived at by counting total population in 20 randomly selected cabbage plants. Pupal population was correlated with adult catch recorded a fortnight after population assessment in the field.

### RESULTS AND DISCUSSION

DBM male catch in pheromone trap was noticed throughout the year in the Nilgiris. In the first year, weekly catch ranged from 5.57 to 48.71 moths per day with seven peaks at bimonthly interval. June 91 registered the peak catch (Fig.1) During the second year (1991-92), weekly catches ranged from 0.71 to 68.28 moths per day with three peaks during October, February and March. In both the years, peak catches were observed during summer months with drop in subsequent months. With the same pheromone blend Koshihara (1988) reported similar increase in population from spring to early summer. DBM was inactive when it was cold and the pheromone response of the males to the bait gradually increased during early spring (Maa, 1986). The observation in the present studies shows that a similar phenomenon exists in the Nilgiris.

The weather elements cumulatively contributed to 16.36 percent variation in trap catch (Table 1). The fitted multiple regression equation to predict pheromone trap catch with weather elements was  $\hat{Y} = 1.27 + 1.29 x_1 - 1.88 x_2 - 0.05 x_3 - 0.03 x_4 + 0.86 x_5 + 0.97 x_6 - 0.02 x_7 + 1.44 x_8$ . Among the weather elements, minimum temperature, relative humidity and total rainfall showed negative influence whereas maximum temperature, wind velocity, sunshine hours and rainy days exhibited positive influence on moth

Table 1. Multiple regression analysis between male DBM pheromone catch and weather elements (n = 106)

Variables	Partial regression Coefficient (b)	Standard error (SE <sub>D</sub> )	t	Beta
X <sub>1</sub> (Maximum temperature <sup>o</sup> C)	1.2932	1.2625	1.0242	0.2198
X <sub>2</sub> (Minimum temperature <sup>o</sup> C)	-1.882160	1.2903	-1.4586	-0.2464
X <sub>3</sub> (Relative humidity-Morning %)	-0.0591	0.2693	-0.2196	-0.0573
X <sub>4</sub> (Relative humidity-Evening %)	-0.0376	0.2925	-0.1286	-0.0445
X <sub>5</sub> (Wind velocity, KM/hr.)	0.8676	0.5283	1.5407	0.2115
X <sub>6</sub> (Sunshine hrs.)	0.9750	0.9101	1.0712	0.2050
X <sub>7</sub> (Total rainfall, mm)	-0.0237	0.0732	-0.5242	-0.0522
X <sub>8</sub> (Rainy days)	1.44	1.5023	0.9632	0.1889

Constant term R<sup>2</sup> = 0.1636

A = 1.1279

catches. In the present study, pheromone response was low at minimum temperature. For every decrease in minimum temperature by 1<sup>o</sup>C there was a decrease of 1.88 moths attracted in the trap. Temperature is generally recognised as a major factor affecting the mating behaviour and orientation of males to the lure (Maa, 1986). A higher altitudes in the Nilgiris, higher percentage of relative humidity is noticed from July-November months. Reduction in moth catch by 0.05 and 0.03 moth was noticed for every increase in morning and evening relative humidity respectively.

Relative humidity (RH) and male orientation response to the pheromone baits was linear upto 75

per cent. Any increase in RH over the interception point would decrease in male response and necessitates corresponding change in the ratio of pheromone blend (Maa *et.al.*, 1985). DBM establishment and male adult catch are negatively associated with rainfall (Harcourt, 1963; Maa *et al.*, 1987). The present investigation corroborates with above findings. For every one mm increase in rainfall, there was a drop in male moth catch by 0.02.

Correlations studies between the male moth catches and pupal population indicated a significant positive correlation with a regression value of  $\hat{Y} = 12.47 + 7.86 x$  ( $r=0.95$ ) From the

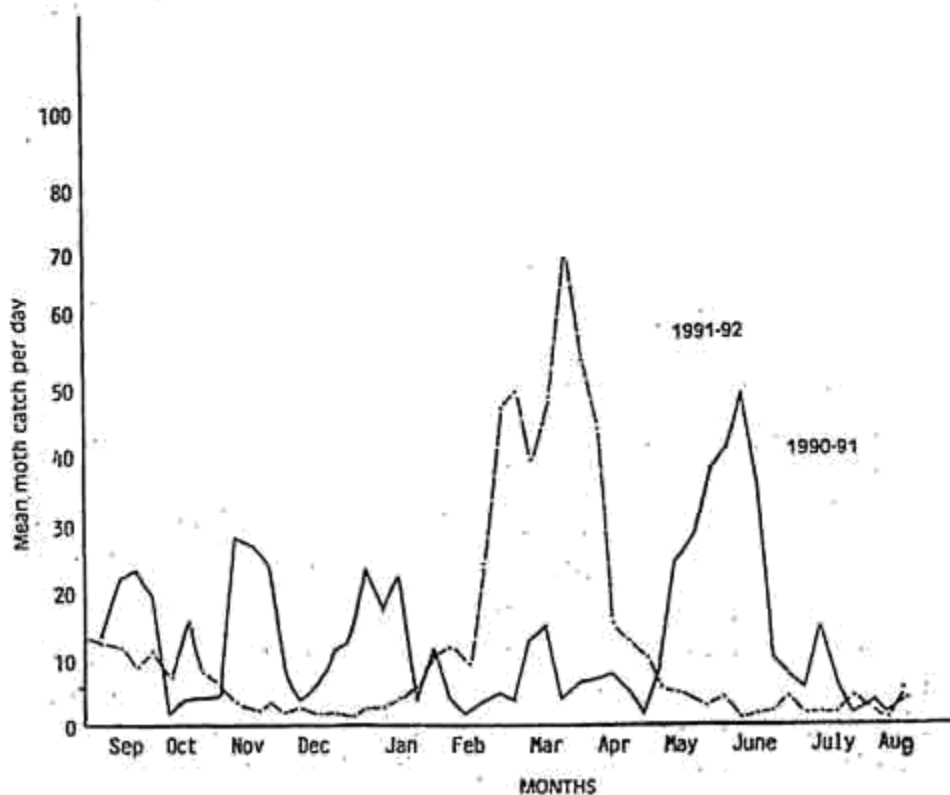


Fig. 1. Weekly DBM catch in pheromone trap

studies, it may be concluded that DBM male moth catch was more in summer months and positively correlated with pupal population in the field. Minimum temperature, relative humidity and total rainfall had negative association with male moth orientation to pheromone trap.

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## MONITORING THE ACTIVITY OF POTATO TUBER MOTH THROUGH PHEROMONE TRAP

N.CHANDRAMOHAN

Horticultural Research Station  
Tamil Nadu Agricultural University  
Udhagamandalam 643 001

#### ABSTRACT

The sex pheromone of potato tuber moth, *Pthorimaea operculella* (Zeller) was evaluated at higher altitude of the Nilgiris district. Male moth catch was notice throughout the year. Different lunar phases did not influence the moth catch. Maximum trap catch was recorded between 7 and 8 p.m. In hill zone, a septum remained effective for 14 months.

**KEY WORDS :** Potato Tuber moth, Pheromone, Lunar phase.

Potato tuber moth (PTM) *Pthorimaea operculella* (Zeller) is one of the the most damaging pests of potato in the Nilgiris district of Tamil Nadu. The use of pheromone in integrated pest management of PTM is widely recommended in different potato growing countries (Raman, 1988). In the present investigation, the sex pheromone of PTM was evaluated at higher altitude for monitoring the population of male moths and the results are reported.

#### MATERIALS AND METHODS

Studies on seasonal variation in male moth catches of PTM, effect of lunar phases on moth catches, hourly attraction and functional active period of the septum were carried out at the

Horticultural Research Station, Tamil Nadu Agricultural University Udhagamandalam from October 1991 to September 1993. The experimental site is located at 2300 m above MSL.

The sex pheromone septa obtained from the International Potato Research Centre, Peru were used in water pan traps placed at 50 cm above ground level in an unsprayed potato field. The area under potato was 2.5 ha in first (1991-92) and 1 ha in the second year (1992-93).

The pheromone of PTM consisted of a blend of PTM 1 (trans -4, cis- 7-tridecadien-1-ol acetate) and PTM 2 (trans - 4, cis-7, cis-10- tridecatrien - 1-ol acetate). The septa were replaced once in a month excepting for the study on functional active period, wherein the septum was retained in the trap