

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.

REFERENCES

- CHOW, Y.S. CHI, S.C. and CHIEN, C.D. (1974). Demonstration of a sex pheromone of diamondback moth, Lepidoptera, Plutellidae. *Ann. Entomol. Soc. Amer.*, 67 : 510-512.
- CIE (COMMONWEALTH INSTITUTE OF ENTOMOLOGY) (1967). *Distribution Maps of Pests - Map No.32 (Revised)*, Commonwealth Institute of Entomology, London, U.K.
- HARCOURT, D.G. (1963) Major mortality factors in the population dynamics of the diamondback moth, *Plutella maculipennis* (Curt.) (Lepidoptera : Plutellidae). *Can. Entomol. Soc. Mem.*, 32 : 55-56
- KOSHIHARA, T. (1988). Survey of diamondback moth, *Plutella xylostella* L. (Lepidoptera : Yponomeutidae) populations in cabbage fields using the synthetic female sex pheromone. *Bull. Natl. Res. Inst. Veg. Ornam. Plants Tea Ser.*, N2 : 117-141.
- MAA, C.J.W. (1986). Ecological approach to male diamondback moth response to sex pheromone. In : *Diamondback Moth Management. Proceeding of the First International Workshop, Taiwan. AVRDC.* pp. 109-123.
- MAA, C.J.W., LIN, Y.M. and YING, Y.J. (1965) Temperature and humidity effect to sex behaviours of the male adults elicited by the synthetic sex pheromone of the diamondback moth, *Plutella xylostella* Bull. Inst. Zool. Acad. Sin., 24: 75-84.
- MAA, C.J.W., CHEN, Y.W., YING, Y.J. and CHOW, Y.S. (1987). Effect of environmental factors to male adult catch by synthetic female sex pheromone trap of the diamondback moth, *Plutella xylostella* L. In Taiwan. *Bull. Inst. Zool. Acad. Sin.*, 26: 257-270

(Received: November 1992 Revised : May 1995)

Madras Agric. J., 82(9, 10): 505-507 September, October 1995
<https://doi.org/10.29321/MAJ.10.A01245>

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

WEEKLY POTATO TUBER MOTH CATCH IN PHEROMONE TRAP

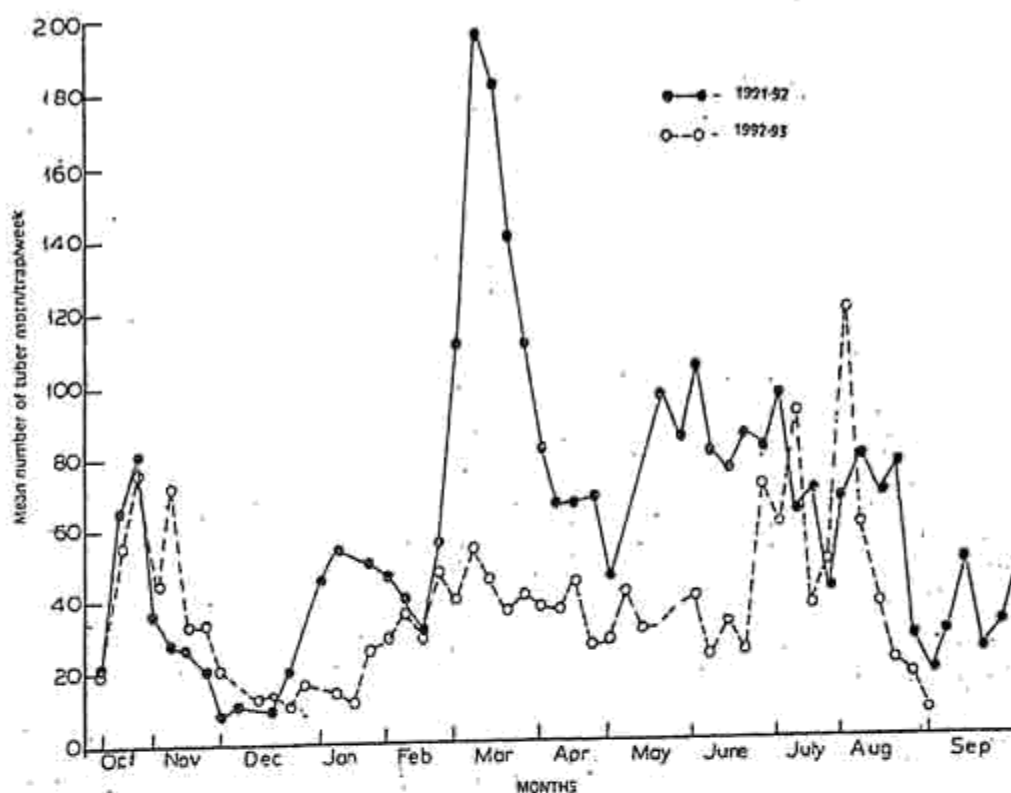


Fig. 1. Weekly potato tuber moth catch in pheromone trap

till it remained effective. Daily trap catches were counted and mean catches were arrived at for week and different lunar phases. For hourly attraction study, total of moths trapped was studied at hourly interval from 6.p.m. to 6 a.m. for eight consecutive nights. For all the studies, the treatments were replicated three times.

RESULTS AND DISCUSSION

Seasonal Variation

The weekly PTM catch in different years is shown in Fig. 1. The moths were on wing

Table 1. Effect of different lunar phases on attraction of potato tuber moths to pheromone trap

Lunar phase	Number of male moths attracted/night
New moon	89.89 (9.56) a
First quarter	91.71 (9.63) a
Full moon	90.94 (9.56) a
Second quarter	94.57 (9.85) a

Figures in parentheses are transformed value ($\sqrt{X+0.5}$). Means followed by a common alphabet are not significantly different at 0.05% level (DMRT).

throughout the period of observation. It indicated that the of PTM life cycle continued throughout the year without any hibernation or aestivation in the hill region. Similar results of PTM male moth catch without any physiological arrest was reported in plateau also (Raj 1988). Mean weekly catch ranged from 7 male moths/ night to 195.42/night during 1991-92 and 6.75/night to 118.71/ night in

Table 2. Hourly catches of potato tuber moth, *P. operculata* in pheromone trap

Hour	Per cent catch to the total
6-7 pm	7.07 cd
7-8 pm	49.02 a
8-9 pm	17.55 b
9-10 pm	9.52 c
10-11 pm	5.82 cde
11-12 am	6.32 cde
12-1 am	3.05 e
1-2 am	1.61 a
2-3 am	0.0 f
3-4 am	0.0 f
4-5 am	0.0 f
5-6 am	0.0 f

Mean of eight night catches

Means followed by a common alphabet are not significantly different at 0.05% level (DMRT).

Table 3. Functional activity of PTM septum in the Nilgiris

Period of exposure in months	Total moths attracted per month*
First Month	1463.14 (38.25) a
Second Month	755.85 (27.48) c
Third Month	279.60 (16.71) d
Fourth Month	1052.52 (32.44) bc
Fifth Month	576.71 (24.01) c
Sixth Month	1255.81 (35.43) b
Seventh Month	1148.20 (33.81) b
Eighth Month	1870.41 (43.24) a
Ninth Month	1290.82 (35.92) c
Tenth Month	656.42 (25.62) c
Eleventh Month	762.61 (27.62) c
Twelfth Month	606.26 (24.62) c
Thirteenth Month	672.40 (25.93) c
Fourteenth Month	265.20 (16.29) d

* Mean of three traps.

Figures in parentheses are transformed ($\sqrt{X + 0.5}$) values. Means followed by a common alphabet are not significantly different at 0.05% level (DMRT).

1992-93. Higher trap catch was recorded during first week of March '92 in the first year and last week of July '93 in second year. Seven peak catches were observed during 1991-92 and it was four during 1992-93.

The population build up of PTM increased in successive generation in place where abundance of space and food was available (Chaudhary *et al* 1979. More broods and moth catches in 1991-92 than in 1993 was attributed to the reduction in potato area in the later year.

Lunar phase

The male moth catches among the lunar phase are presented in Table 1. Per night catch in different phases ranged from 89 to 94.97 and all the period registered statistically uniform level of attraction. Though PTM moths are nocturnal in habit (Haines, 1977), the study indicated that the difference in luminosity among lunar phases did not influence the photoperiodic response of the pest.

Hourly attraction

Per cent moths attracted at hourly interval from 6 pm to 6 am is given in Table 2. The moths were attracted to pheromone system upto 2 am only. Before mid-night, 95.30 per cent of trap catch was

noticed. Among the pre-mid- night period, maximum catch was recorded between 7 and 8 pm accounting to 49.02 per cent of the total catch. The PTM reproductive behaviour has been greatest at temperature between 20 ° and 30°C (Haines, 1977) and absence of trap catch in early hours was attributed to the arrest in the activity of the moths due to the prevalence of average minimum 5.6 °C at the experimental site.

Functional activity

The period of attraction of an exposed PTM is furnished in Table 3. Mean attraction per moth in different periods ranged from 265.20 to 1463.14 months. Septum attracted the moths continuously for a period of 14 months. Steady decline in trap catch was recorded from the 10 month onwards and it was more apparent during 14 month after exposure. Yathom *et al.* (1979) and Raman (1988) earlier reported the effective present of attractancy of the PTM septum as 12 months. The higher period of effectiveness in the present investigation was attributed to the frigid condition at higher altitude leading to slower dissipation of the chemicals.

ACKNOWLEDGEMENT

The author is grateful to Dr.K.V.Raman, International Potato Centre, Peru for providing pheromone septa.

REFERENCES

- CHAUDHARY, R., RAJ, B.T. and SAXENA, A.P. (1979). Studies on the growth of *Phthorimaea operculella* (Zell.) J.Indian Potato Assn. 6 : 149-156.
- HAINES, C.P. (1977) The Potato tuber moth, *Phthorimaea operculella* (Zeller) a bibliography of recent literature and a review of its biology and control on potatoes in the field and in store. Rep .Trop. Prod.Inst., G. 112, 15pp.
- RAJ,B.R. (1988) Seasonal variation in the male population of potato tuber moth, *Phthorimaea operculella* (Zeller) in the Deccan plateau. Indian J. Entomol., 50 : 24-27
- RAMAN, K.V. (1988) Integrated insect pest management for potatoes in developing countries. CIP circular 16 (1) : 1-5.
- YATHOM, S., BERLINGER, M.J., DAMAN,R. and VOERMAN, S. (1979). Pheromone baited traps as an aid in studying the phenology of the potato tuber moth, *Phthorimaea operculella* (zeller) in Israel. Phytoparasitica 7 : 195-197.

(Received: August 1992 Revised: March 1993)