Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

J E Z S Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2017; 5(2): 1209-1210

Received: 09-01-2017
Accepted: 10-02-2017

Akash Nirmal
Department of Entomology, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Yogesh Kumar Sidar
Department of Entomology, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Rupesh Gajbhiye
Department of Entomology, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Jaya Laxmi Ganguli
Department of Entomology, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Correspondence
Akash Nirmal
Department of Entomology, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

The effects of moonlight phases on light-trap catches of insects

Akash Nirmal, Yogesh Kumar Sidar, Rupesh Gajbhiye and Jaya Laxmi Ganguli

Abstract
The effects of moon light phases on light trap catches of insects was investigated by using simple incandescent light trap model with tungsten filament 60 watt bulb at the experimental research farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The present Study observed that the insect population was highly significant and negatively correlated ascending phase (r = -0.923) and during descending phase but non-significant correlation (r = -0.225) of trap catches with the lunar cycle was observed.

Keywords: Light trap, ascending phase, descending phase, lunar cycle

1. Introduction
Light traps are commonly used to sample night flying noctuid moths (Lepidoptera: Noctuidae) and are the most efficient way of capturing large numbers of individuals. Noctuids are the most species-rich family in the Lepidoptera (Fibiger 1990, Gaston 1991, Scoble 1992) [4, 5, 13], and usually comprise a larger proportion of captures in light and bait traps than any other family. Data from light traps have been used for a variety of purposes, such as sampling populations of pest species.
According to previous studies, the most important environmental effect on the number of individuals caught in light traps is that of temperature, wind, rainfall and moonlight. Only a few entomologists dealt with the modificator effects of the moonlight on the effectiveness of light-traps. Basic and quantitative results were published by Williams (1936) [10] and showed that the highest number of noctuid moths was trapped on the 2nd, 4th day after new moon, while the minim al values were observed in the catches during the same period after full moon. The abundance curve shows assymetry by the moon phases, which confirms the fact that the light, reflected by the two hemispheres of the Moon is not identical. Observed at the same place, the moonrise is postponed about 50 min daily, which causes an additional assymetry. The effect of moonlight on the numbers of moths caught is generally negative (Williams 1936, Vaishampayan and Shrivastava 1978, Harstack 1979, Nowinsky *et al*. 1979, Vaishampayan and Verma 1982, Nag and Nath l99l) [10, 11, 6, 8, 12, 7]. However, 2 studies of moths found positive correIations (Bowden and Morris 1975, Harstack 1979) [2, 6] and 5 found no correlation.

2. Material and Methods
The experiment was conducted at the experimental research farm, Department of Forestry, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during 45th to 12th standard week of 2014-15 by using simple incandescent light trap model. The light trap was installed at 3 meter above ground level. Light trap was operated from 7p.m. to 10:30 p.m. daily and order wise separation and number of insects caught were recorded. The position of moon for each calendar day of observation was determined from moon phase calendar at moonconnection.com. The intensity or brightness on moon was measured in terms of degree of moon phase. The "full moon" was considered as 360^0 and no moon as 0^0 phase, with the division of 360^0 by 15, each day represented a change of 24^0, increasing in ascending phase and decreasing in descending phase of lunar cycle.

3. Result and Discussion

The effect of moon light on light trap collection was analyzed during the present study. The complete lunar cycle of moon consists of two phases i.e. first is the ascending phase (No moon to Full moon) and second is descending phase (Full moon to No moon) and the data was analyzed accordingly. The result revealed a highly significant negative relationship between trap catch and ascending phase of lunar cycle with "r" -0.923 (Table 1.1). The result shown in Table 1.2 revealed a non-significant negative relationship between trap catch and descending phase of lunar cycle with "r" -0.2295.

These findings are in agreement with Nowinszky and Pukas, 2009 who mentioned that lowest catches of the European corn borer, *Ostrinia nubilalis* was obtained at full moon, but contradicts with Dubey, 1984, who stated that the population of green leaf hopper, *Nephotettix virescence* and *N. nigropectis* was in the increasing trend during ascending phase of the moon.

I. Ascending phase of lunar cycle

(During 45,46,49,50 01, 02, 05, 06, 09and 10th Standard Meteorological Week)

Table 1.1: Correlation between degree of moon phases and the light trap catches of insect population

Lunar day	Degree of moon phase	Average insect population
1.	24	17.4
2.	48	16.4
3.	72	18.2
4.	96	15.2
5.	120	17.4
6.	144	20.8
7.	168	18.4
8.	192	21.2
9.	216	25.2
10.	240	24.6
11.	264	23.6
12.	288	25.2
13.	312	23.6
14.	336	25
15.	360	19.2
	Correlation coefficient = 0.74064*	

*Significant at 5% level

II. Descending phase of lunar cycle

(During 47, 48, 51, 52, 03, 04, 07, 08, 11and 12th Standard Meteorological Week)

Table 1.2: Correlation between degree of moon phases and the light trap catches of insect population

Lunar day	Degree of moon phase	Average insect population
1.	336	17.5
2.	312	26.4
3.	288	31.25
4.	264	26.4
5.	240	23.6
6.	216	23.4
7.	192	25.8
8.	168	22.2
9.	144	23.2
10.	120	24.4
11.	96	25.8
12.	72	25.2
13.	48	25.8
14.	24	24
15.	0	29.8
	Correlation coefficient = -0.2295	

4. Conclusions

The present study provides scientific information on the effect of moon light on light trap collection revealed a negative and highly significant relationship between trap catch and ascending phase of lunar cycle whereas a negative and non-significant relationship between trap catch and descending phase of lunar cycle was observed.

5. References

1. Borbon KC. Studies on Light Trap catches of Green leaf hoppers of *Nephotettix* Species (Hemiptera: delphacidae) of Rice and its Morphomatrix. M.Sc. Thesis. Indira Gandhi Agricultural University, Raipur. 1988, 20-88.
2. Bowden J, Morris MG. The influence of moonlight on catches ofinsects in light-traps in Africa. Part III. The effective radius of a mercury-vapour lighttrap and the analysis of catches using effective radius. Bull. Entomol. Res. 1975; 65:303-348.
3. Dubey VK. Light trap studies on green leaf hoppers of Rice *Nephotettix* Species (Hemiptera:deltociphalidae). M.Sc. Thesis. Indira Gandhi Agricultural University, Raipur. 1984, 19-61.
4. Fibiger M. Noctuidae Europaeae, l. Noctuinae, I. Entomological Press, Soro, Denmark, 1990.
5. Gaston KJ. The magnitude ofglobal insect species richness. Conserv. Biol. 1991; 5:283- 296.
6. Harstack AW. Light sources, trap design and other factors affecting moth catch, 1979, 232-240.
7. Nag A, Nath P. Effect of moon light and lunar periodicity on the light trap catches of cut worm *Agrotis ipsilon* (H.) moth. Journal of applied entomology. 1991; 111(5):358-360.
8. Nowinsky L, Szábo S, Toth G, Kiss M. The effect of the moonphase and of the intensity of polarized moonlight on the light light-trap catches. Z. Angew. Entomol. 1979; 88:337-353.
9. Nowinszky L, Puskas J. Light trap catch of European corn borer, *Ostrinia nubilalis* depending on the moon light. Acta entomological Serbica. 2009; 14(2):163-174.
10. Williams CB. The influence of moonlight on the activity of certain nocturnal insects, particularly of the family Noctuidae as indicated by a light trap. Phi!. Trans. Roy. 50C. (London). 1936; *B*226:357-389.
11. Vaishampayan SM, Shrivastava SK. Effect of moon phase and lunar cycle on the light-trap catch of tobacco caterpillar Spod.optera llara (F.) (Lepidoptera: Noctuidae). J. Bombay Nat. Hist. Soc. 1978; 75:83-87.
12. Vaishampayan SM, Verma R. Influence of moonlight and lunar periodicity on the light trap catches of gram podborer, Heliothis annigera (Hiibner) moths. Indian J Entomol. 1982; 44:206-212.
13. Scoble MJ. The Lepidoptera. Form, function and diversity. Oxford University Press, Oxford, 1992.
14. Yela JL, Holyoak M. Effect of moon light and Meteorological factors on light and bait trap catch of Noctuid moths (Lepidoptera: Noctuidae). Environment Entomology. 1997; 26(6):1283-1290.