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The effect of different photoperiod on the weight of different larval Instars of Eri Silkworm (*Philosamia ricini*) L (Saturniidae: Lepidoptera)

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Abstract

The effects of different photoperiod on the weight of different larval Instars of Eri Silkworm (*Philosamia ricini*) in gram were studied. The experiments were performed in Zoology Department of Govt. P.G. M.V.M. Ujjain. The disease free laying (DFL'S) were collected from Govt. Sericulture Dept. Indore. Worms were reared under hygienic laboratory condition. The optimum temperature 25±2ºC and relative humidity 75±5% were maintained during complete experiment. The IInstar larvae attained maximum weightat 12hr. light and 12hr. dark. The II, III and IV Instars attained maximum weight in complete darkness and lowest weight in complete light.The V Instarlarvae attained maximum weight at 8hr. light and 16hr. dark.

Keywords: Sericulture, Photoperiod, Philosamiaricini, larval Instars, Nocturnal

Introduction

The interval in a 24-hour period during which a plant or animal is exposed to light is called Photoperiod. The earth's "Natural Photoperiod" is the resultant of the environmental rhythm of recurring alternations of illumination and darkness. Insects are evolved in an environment dominated by daily periodicity. They express many physiological and behavioral daily rhythms at many different levels. The use of light as a navigational or directional orientation cue has been studied extensively in diurnal insects Pfeiffer and Homberg (2007) but has been investigated for only a few insects active in crepuscular or nocturnal light with inherently diverse irradiance spectra. High-intensity light was more effective than low-intensity light in attracting moths Stremerz (1959). Sericulture is the science of rearing silkworm for the commercial production of raw silk, and includes the operations, which are required for the production of silk fiber Krishnaswami*et al.* (1973). Silk is the most elegant textile in the world with unparalleled grandeur, natural sheen, and inherent affinity for dyes, high absorbance, light weight, soft touch and high durability and known as the "Queen of Textiles" the world over. Eri Silkworm is knownas Non violence silk or Ahinsa silk (there is no need to kill the pupae inside the cocoon as in case of other silk because the Eri silk is spun into thread like cotton). It is said to be Poor Person's Silk because of its cost of production is very less than other silk Sarkar, D.C. (1980).Eri silk is produced by Eri Silkworm (*Philosamia ricini*) (Lepidoptera: Saturniidae) has a unique distinction among other three silkworms of having its potential host, the castor (*Ricinus communis*) an important agricultural oil bearing crop (jolly *et al.* 1979; Basaiah 1988; Pandey 1995; Reddy *et al.* 1998; Debaraj *et al.* 2000). In the present study, some experiments were carried to determine the effect of Photoperiod on the weight of different larval Instars of Eri Silkworm (*Philosamia ricini*). This study may be further useful to those who are eager to contribute to the sustainable development of rural India through Ericulture.

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Materials and Method

The present study conducted in Zoology Department of Govt. P. G. Madhav Vigyan Mahavidhyalay Ujjain. Zoology Department runs Sericulture (Applied Animal Science) as a special paper for Postgraduate Course. Department has a well established and equipped Sericulture Laboratory and well maintained Mulberry and Castor garden for nourishment of Mulberry and Eri

Silkworm. In the present study insects were reared in the Sericulture laboratory on Castor plant leaves. Disease free lying (DFL's) of Eri Silkworm (*Philosamia ricini*) collected from Sericulture Rearing Centre Indore (M.P.) and reared for the purpose of various studies, and standard tray rearing method was adopted as recommended by Choudhary *et al.* (1982). The rearing room and equipments were cleaned, washed thoroughly and properly disinfected with 2% formalin (by using a sprayer) before rearing. Rearing was carried out under hygienic conditions of feeding, cleaning, spacing and sanitation as followed by Krishnaswami *et al.* (1973). In the experiment, Eri Silkworm (*Philosamia ricini)* was reared under laboratory conditions of optimum 25±2ºC temperature and 75±5% relative humidity up to adult stage. There were six experimental units with larval parameters (effect of photoperiod on larval weight). Total experiment laid out in a completely Randomized Design (CRD) with 5 replications. Larval Instars were selected from bulk and divided in six groups. First group (G1) reared with complete light (LL), second group (G2)having 12hr. light and 12hr. dark, third group (G3) reared with 10hr. light and 14hr. dark, forth group (G4)reared with 08hr.light and 16hr. dark, fifth group (G5) reared with 05hr.light and 19hr.dark and sixth group (G6) reared with complete darkness (DD). Larval weight calculated under all six conditions. The data was analyzed by using ANOVA.

Results and Discussion

Overall rearing performance of Eri Silkworm (*Philosamia ricini*) larvae kept in different photoperiod condition provided with same conditions of optimum temperature (25±2ºC) and relative humidity (75±5%) is shown in Table 1.

Table 1: The effect of different photoperiod on the weight of different larval instars of Eri Silkworm (*Philosamia ricini*) in gram at 25±2ºC and 75±5%RH.

Group	Photoperiod	I Instar	II Instar	III Instar	IV Instar	V Instar
G1	LL	1.20	2.2	3.5	5.4	7.2
G2	12L:12D	1.25	2.4	3.7	5.7	7.4
G3	10L:14D	1.13	2.8	3.8	5.8	7.8
G4	08L:16D	1.05	3.2	3.9	5.9	9.2
G5	05L:19D	0.99	3.6	4.0	6.0	8.2
G6	DD	0.98	3.8	4.4	6.2	8.1

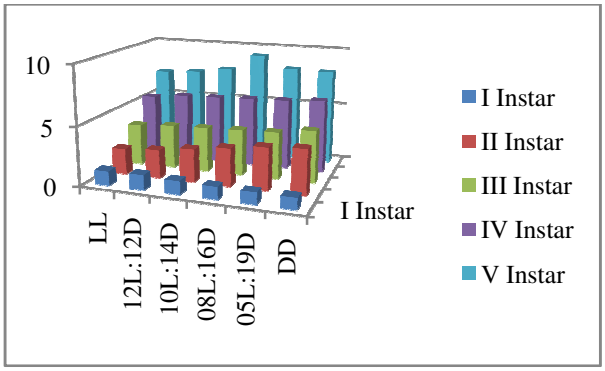

Fig.1: Mean of larval Instar weight of Eri Silkworm (*Philosamia ricini*) in gram with different Photoperiod. IInstar larvae (maximum weightat 12L: 12D), II, III and IV Instars (maximum weight in DD) and V Instarlarvae (maximum weight at 8L: 16D).

Result shows that I instar larvae attained maximum larval weight (1.25) in 12hr.L:12hr.D. While II, III and IV instars shows maximum larval weight respectively 3.8, 4.4, and 6.2 in complete dark (DD). Perhaps result influence by their nocturnal habit. The V instar larvae attained maximum weight at 8hr. light and 16hr. dark photoperiod (9.2) it reported that because of they goes to metamorphosis after full grown maturity of V Instar larval stage to pupal stage. When Goryshin and Akchmedov, (1971) reported that the larval growth in *Agrotis vipsilon* (Hfn.) Rott, was

controlled by photoperiod and in 12-18 h. of photo phase the development was slow. Further, this photo phase induce growth in early instars. Saulieh, (1975) studied the development of two species of *Cirphis unipuncta* (Haw.) and reported that photoperiod did not affect the total duration of development, but influenced the growth rate of larvae and synchronized their development. While Shimizu, (1983) studied the photoperiodic induction in the Silkworm, *B.mori*, reared on artificial diet. The silkworm became photo periodically responsive during larval development.

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