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EFFECT OF MULTIPLE USE OF MALE MOTH ON FERTILITY (REPRODUCTIVE PARAMETER) OF ERI SILK MOTH *PHILOSAMIA RICINI* IN DIFFERENT SEASONS

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Abstract: The fecundity and fertility are two major components of silkworm seed production. The relationship between the fecundity and fertility of ***Philosamia ricini*** was inversely proportional to the number of moth pairs in the container. The effect of multiple use of male moth on fertility was investigated in Eri Silkworm, ***Philosamia ricini.*** Multiple use of male moth caused significant reduction in fertility. From G_1 to G_5 mating no significant reduction in fertility was observed, while after G_6 and G_7 mating fertility reduction is considerably significant.
Key words: Eri silkworm, Fertility, Mating, Cocoon, *Philosamia ricini*, Reproductive parameter.

Introduction:

Quality silkworm seed is vital for viable sericulture industry. Quality refers to richness of egg-laying, viability, uniform hatching and subsequently good rearing performance of the progeny (Ullal and Narashimhanna, 1978). Timely supply of adequate quality and quantity of disease free silkworm eggs to the sericulturists are crucial for successful harvest of cocoon crops. The production of silkworm seed involves a long chain of interdependent and highly specialized conditions. Since egg production of the silkworm is managed by seed producers, various processes such as procuring the quality cocoons, emergence of moths, mating, egg-laying, preservation and hatching of eggs are all important from the point of maximizing viable egg production (Ayuzawa *et al.,* 1972; Jolly, 1983; Kovalev, 1960; Yokyoma, 1962). Duration of coupling assumes great importance in commercial egg production. In ***Philosamia ricini*** three hours of mating is sufficient to get complete fertility. If male moth is used again and again, the cost of seed cocoon production can be reduced. Hence a systematic study was conducted with some popular bivoltine and multivoltine breeds being practiced in tropical parts of India.

Fertility % is this:-

$$Fertility\ \% = \frac{No.\ of\ eggs\ hatched}{No\ of\ eggs\ fertilized} \times 100$$

Material and Methods:

Total of 400 moths were selected from healthy, freshly emerged batch of both sexes and divided into 07 groups, with 15 couples in each group. The moths were allowed to mate. The same male was used for repeated mating in each group, after giving different resting periods. Every time fresh female was used. The Decoupling was done after 3 hrs of mating. After decoupling, females were kept for oviposition. During the time of coupling, decoupling and oviposition 25°C ± 1°C and 75 - 80% relative humidity were maintained. This experiment was performed in three seasons- Rainy Season, Autumn Season and Winter Season.

Treatment details:-

G_1 – Fresh males are used (9:00 am.–12:00 pm.).

G_2 – male used in G1 will be used after 1 hour rest at 5oC (1:00 pm -4:00 pm).

G_3 – male used in G2 will be used after 16-18 hrs rest at 5oC (9:00 am -12:00 pm in the next day).

G_4 – male used in G3 will be used after 1 hour rest at 5oC (1:00 pm -4:00 pm in the same day).

G_5 – male used in G4 will be used after 16-18 hrs rest at 5oC (9:00 am -12:00 pm in the next day).

G_6 – male used in G5 will be used after 1 hour rest at 5oC (1:00 pm -4:00 pm in the same day).

G_7 – male used in G6 will be used after 16-18 hrs rest at 5oC (9:00 am -12:00 pm in the next day).

Eggs laid by the mated females were collected, counted and kept under laboratory conditions until Fertility. The Fertility percentage was recorded and analyzed statistically (ANOVA). The investigation was carried out at the Zoology Department, Govt. Madhav Science P.G. College, and Ujjain.

Results:

The present study was undertaken to know the impact of multiple use of male moth on fertility (reproductive parameter) in Eri silkworm, ***Philosamia ricini***. Significant differences were observed among different treatments in group G_1 to G_7. Higher fertility was observed in G_1 and lower in G_7.

Discussion:

The fecundity and fertility are two major components of silkworm seed production. The relationship between the fecundity and fertility of ***Philosamia ricini*** was inversely proportional to the number of moth pairs in the container (Shrivastav and Mishra, 1985). Multiple mating of both males and females copulate with two or more partners, is widely documented in numerous species (Keller and Reeve, 1995; Ridley, 1990). Torres-Vila *et al.* (2002) observed in Lobesia botrana that delayed mating did not affect female mating success but fertilization

was reduced, but more number of day's delays of mating substantially affected daily oviposition pattern and resulted in a significant reduction of both fecundity and fertility. Vemanantha Reddy *et al.* (2002) reported decrease in fertility was occurred in Silkworm ***Bombyx mori,*** when cold stored male was used for 3rd pairing. They also reported, effect of cold storage was more pronounced in multivoltine (Pure Mysore) than bivoltine (NB4D2). Mating frequency and duration have an important impact on reproductive fitness in insects. The age of mating individuals is apparently a key factor in reproduction with effects on their sexual performance and progeny production (Ahamed *et al.,* 2004). Knight (2007) in their study in Cydia pomonella L. observed sequential mating by male moths had no effect on the fecundity of female moths or egg fertility; however, male moth age did impact on fertility. So decrease in fertility after 4th pairing might be due to aging effect of male as well as depletion of sperm. In the present study, no significant variation in fertility was observed in Eri Silkworm, ***Philosamia ricini.***

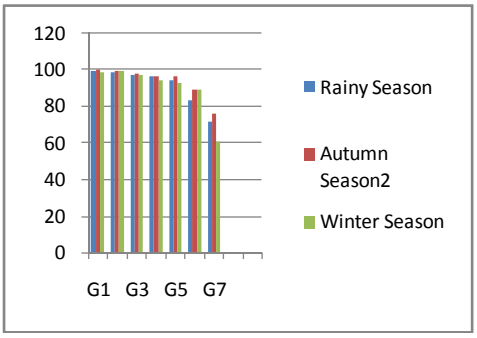

Figure.1. Effect of multiple use of male moth on fertility % (reproductive parameter) of Eri Silkworm, ***Philosamia ricini*** groups from G1 to G7 at different treatments in different seasons. Vertical column represent the standard error of the mean.

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