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EFFECT OF MULTIPLE USE OF MALE MOTH ON FECUNDITY (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 fecundity was investigated in Eri Silkworm, ***Philosamia ricini.*** Multiple use of male moth caused no significant variation in fecundity in different season.
Key words: Eri silkworm, Fecundity, Mating, Cocoon, *Philosamia ricini*, Reproductive parameter.

Introduction:

Multiple mating by males is widespread in insects, including the Lepidoptera. A male's reproductive output is closely linked with the number of females he is able to inseminate, so it is widely accepted that the best male strategy to maximize fitness is generally to acquire as many mates as possible (Trivers 1972; Thornhill and Alcock 1983). In the Lepidoptera, the effect of male mating history on female fecundity is unclear. Some studies show that females that mate with sexually experienced males have lower lifetime fecundity than those that mate with virgin males, while other studies do not find this relationship. This inconclusive scenario may occur because male mating history is affected by a number of factors. The size, quality and number of spermatophores delivered by males have been shown to be highly sensitive to such factors as male age at mating, body weight, larval and adult feeding regime, mating order and the time that elapses between consecutive matings (Torres-Vila *et al.* 1995 and references therein). It may also be the case that the effect of male mating history on female fecundity is modest and that many studies that report no significant relationship do so because of small sample sizes and low statistical power (Jennions and Moller 2003). 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.

Material and Methods:

Total of 370 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 Fecundity. The Fecundity percentage was recorded and analyzed statistically for the ANOVA. The investigation was carried out at the Zoology Department, Govt. P.G. Madhav Science College, Vikram University, Ujjain.

Results:

The present study was undertaken to know the impact of multiple use of male moth on fecundity (reproductive parameter) in Eri silkworm, ***Philosamia ricini***. In case of

fecundity, no significant variation was observed in G_1 to 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). Studies on T. castaneum have shown that males can successfully inseminate as many as three different females in rapidly sequential copulations, and that the number of sperm transferred generally declines across consecutive mating (Bloch Qazi *et al.* 1996). 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. Kunal Sarkar *et al.* (2009) observed 63% fertility on 6th pairing when multivoltine male [M12 (W)] used, where as in bivoltine (NB4D2) it was 80%. It indicates the bivoltine male has more potency than multivoltine male and can withstand low temperature longer time.

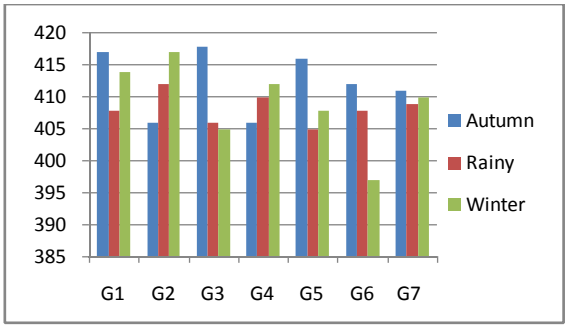

Figure.1- Effect of multiple use of male moth on fecundity % (reproductive parameter) of Eri Silkworm, ***Philosamia ricini*** groups from G1 to G7 at different treatments in different seasons. Vertical column represent the standard error of the mean.

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