Studies on Fecundity, Mating Duration and Egg Retention of Muga Silkworm, *Antheraea assamensis* (Lepidoptera: Saturniidae) in Natural and Mechanical Mating

Abstract

Oviposition is one of the most important and vital aspects of seed technology which needs an in-depth study. In the seed production centers, all Muga silk moths do not mate naturally and most of the mating will be done mechanically by hand in order to save time and energy of silk moths in search of mate. So, an experiment was conducted to study the difference in fecundity between naturally mated and mechanically mated Muga silkworms and its impact on mating duration at Silkworm Seed Production Centre, Kaliabari, Boko, Assam on November, 2023. The results of the study showed that, maximum fecundity was observed in silkworms which are naturally mated with 214±12.08 eggs per female. Whereas, the mechanically mated Muga silkworm females showed slightly less fecundity compared to naturally mated females with 203.2±12.77 eggs per female. The results on egg retention showed a clear difference with 18.6±4.77 and 16.6±8.64 eggs per female in natural and mechanical mating, respectively. The slightest reduction in fecundity and increased egg retention in female moths might be due to the impact of mechanical mating on mating duration which reported only 5.5±1.29 hrs, whereas natural mating facilitated a higher mating duration with 8.2±1.30hrs, respectively. This study showed the significance of mating type (natural and mechanical) in fecundity in Muga silk worm.

Key Words: Antheraea assama, Muga Silk Moth, fecundity, oviposition, egg retention

1. INTRODUCTION

Muga silk is known for its natural shimmering golden color and it is the pride of Assam. The silk is produced by the silkworm Antheraea assama, whose production is exclusively confined to Brahmaputra valley of Assam and its neighboring states. The silkworm is semidomesticated and multivoltine in nature having 5 to 6 generations in a year. Quality of silkworm seed is vital for viable sericulture industry and refers to richness of egg laying's,

viability, uniform hatching and subsequently good rearing performance of the progeny. Several factors contribute in production of good quality eggs. Oviposition is one of the most important and vital aspects of seed technology which needs an in-depth study. Mating is a decisive factor which not only influence the total number of eggs but also important in the inducement of the regular Oviposition. . It was reported that mating duration has significant impact on fecundity and fertility of silk moths (Jolly, 1983; Narasimhana, 1988; Ram and Singh, 1992; Goswami and Singh, 2012). The present investigation is undertaken with a view to find out the effect of natural and mechanical mating on mating durations, fecundity egg retention of Muga silkworm, *Antheraea assama*.

2. MATERIALS AND METHODS

The present study was conducted at SSPC, Kaliabari, MESSO, Boko, Assam during December, 2023. . Seed cocoons of Muga silkworm collected were preserved in well ventilated wire mesh cocoon storage cages at normal room temperature till moth emergence following, Thangavelu et al (1988). The freshly emerged male and female moths were allowed to couple naturally and mechanically (Plate.2) in the cocoon preservation cages. The coupled moths were tied to oviposition device (Kharika) made up for the study by binding the female moth with the help of cotton thread (Plate.1). The observations pertaining to oviposition rate, retention rate and mating period were recorded.

3. RESULTS AND DISCUSSION

The results showed that, maximum fecundity (214±12.08) was observed in naturally coupled moths whereas fecundity was slightly lower (203.2±12.77) in mechanically coupled moths. The results on egg retention showed a clear difference with 18.6±4.77 and 16.6±8.64 eggs per female in natural and mechanical mating, respectively. The slightest reduction in fecundity and increased egg retention in female moths might be due to the impact of mechanical mating on mating duration which reported only 5.5±1.29 hrs, whereas natural mating facilitated a higher mating duration with 8.2±1.30hrs, respectively (Fig.1; Table.1). The results pertaining to mating duration were on par to the findings of Thangavelu *et al* (1988) and Goswami and Singh (2012) who also reported mating duration of 4 to 6 hours. The higher fecundity in natural mating

might be due to longer mating period which supported by Barah and Sahu (2003), who reported that mating duration plays a key role in fecundity.

4. CONCLUSION

Our study also reported differences in variation in ovi-position and time-limited fecundity in two different mating types which helped us to understand the importance of mating span and how it can be utilized to boost the egg production in seed production centers. These studies also pave a way for calculating the reproductive trade-offs and cost of reproductive fitness in female moths in near future.

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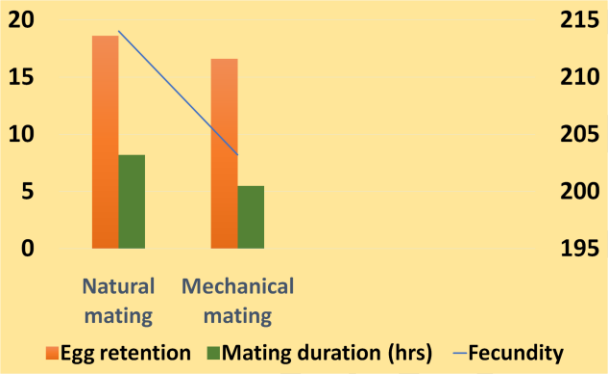

Fig.1: Graph showing Egg retention, Mating duration and Fecundity in Natural and Mechanical mating

Natural mating			**Mechanical mating**		
Fecundity	Egg retention	Mating duration (hrs)	Fecundity	Egg retention	Mating duration (hrs)
Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
214±12.08	18.6±4.77	8.2±1.30	203.2±12.77	16.6±8.64	5.5±1.29

Table.1: Showing Egg retention, Mating duration and Fecundity in Natural and Mechanical mating

Plate.1: Showing females tied to *Kharika* with the help of cotton thread

Plate.2: Showing procedure of mechanical mating in Muga silkworm couples