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.~~

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Key Words: mechanical mating, natural mating ~~*Antheraea assama*,~~ m~~M~~uga ~~Silk~~silkworm, ~~Moth,~~ fecundity, oviposition, egg retention

1. INTRODUCTION

Muga silk is known for its natural shimmering golden color and ~~it~~ is ~~the pride~~sour 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~~ with 5 to 6 generations in a year. The q~~Q~~uality of silkworm seed is vital for a viable sericulture industry and refers to the richness of egg laying~~'s~~, viability, uniform hatching and subsequently good rearing performance of the progeny. Several factors contribute to the ~~in~~ production of good quality eggs. Oviposition is one of the most important and vital aspects of seed technology which requires ~~needs~~ an in-depth study. Mating is a decisive factor that ~~which~~ not only influences the total number of eggs but also plays a crucial role in inducing regular oviposition. ~~important in the inducement of the regular Oviposition. .~~ It has been ~~was~~ reported that mating duration has a 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 the aim of finding out the effect ~~a view to find out the effect~~ of natural and mechanical mating on mating durations, fecundity and 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 (see 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 (see Plate.1). O~~ The o~~bservations pertaining to oviposition rate, retention rate and mating period were recorded.

Comment [st1]: Please add the story about :
1. How do you do Muga silkworm rearing to test for oviposition you did not explain anything about that?

how many replication per treatment for mechanical mating? And from how many the total of the experiment?
please explain detail on the method part

Comment [st2]: In the abstract you mentioned "significant word"
how do you know, you didn't explain anything about statistically analysis ?
please write clearly in this part.

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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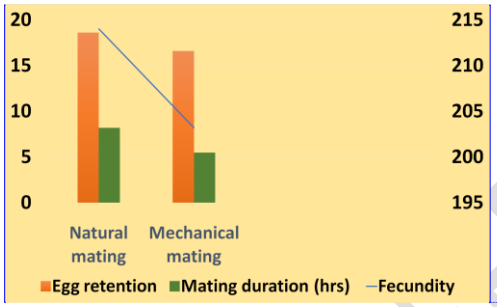

Fig.1: Graph showing Egg retention, Mating duration and Fecundity in Natural and Mechanical mating

Comment [st3]: Please insert the standard deviation on the graph.
provide 3 graph represent x1 Natural mating and mechanical mating=; y1= graph explain egg retention and mating duration

please provide y1 in 100, assume the number in y is until 100 %
graph 2 x2= natural mating and mechanical mating and y2= Fecundity.

please add the unit on the y1 and y2 as what is the unit
for example fecundity is x egg/female? or x per 50 female per cages ? not clear in this paper

please provide the graph with the colour white and black or grey and white.

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

Comment [st4]: Please delete this table as the number in this table can be show up on the Figure 1, to make reader easier to understand quickly.

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

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