

EFFECT OF MATING DURATION ON THE FECUNDITY AND EGG FERTILITY OF SILKWORM, *BOMBYX MORI* L.

Wali-ur-Rahman¹ & Muhammad Khan²

Abstract

Studies were conducted at the Pakistan Forest Institute Peshawar to find out the effect of duration of mating on the fecundity and fertility of eggs of two strains of silkworm, *Bombyx mori* L. Out of 6 mating durations from 1 to 6 hours, 5 hours duration was found for the maximum fecundity and 1 hour duration for the maximum fertility of eggs of Chinese and Japanese silkworm strains. Since mating durations from 1 to 6 hours are statistically non-significant therefore, 1 hour mating duration can be used for the maximum fecundity and the maximum fertility of eggs.

Key word: Mating duration, Fecundity, Fertility, Silkworm.

Introduction

The Pakistan Forest Institute, Peshawar imported F1 silk seed from China and Japan, bred for 5 years and established the following six pure line local strains by segregation and selection with excellent parental characters.

<u>Chinese strains</u>	<u>Japanese strains</u>
C-102	J-101
205-PO	205-MKD
206-PO	206-MKD

These strains are reared twice annually to maintain their progeny for propagation and experimental trials. The male and female moths are coupled for 3 hours duration following the recommendations of Narayan *et al.* (1964) to obtain the fertilized eggs.

In *Bombyx mori*, natural copulation continues for 6-12 hours and some times because of such prolonged copulation female moth dies without laying any eggs. The number of eggs laid by a female moth depends on its genotype and development, which increases in a proportion to the duration of mating (Askari and Sharan, 1984). Punitham *et al.* (1987) stated that mating duration up to 6 hours increased the total egg out put and reduced pre-oviposition period but subsequent increase in duration resulted in negative effects. Krishanaswami *et al.* (1973) reported that first ejaculation starts about 9 minutes after copulation and completed after 25 minutes of mating hence optimum-mating duration of 30 minutes is adequate for obtaining desired number of viable eggs, which is

¹ Senior Research Officer, Pakistan Forest Institute

² Executive Officer, Pakistan Forest Institute

sufficient to provide copulation stimulus essential for egg laying without impairing the percentage of fertility. Also Jadhav and Gajare (1978) described a minimum coupling duration of 30 minutes for maximum egg fertility of silkworm.

The present study was designed to find out the suitable mating duration for higher percentage of fecundity and fertility of eggs of the local pure line silkworm strains under the local climatic conditions.

Materials and methods

Out of the six strains, 206-PO (Chinese) and 206-MKD (Japanese) were selected for this study. 180 pairs each of Chinese and Japanese strains were taken at random in 6 batches of 30 pairs each (10 pairs in each of 3 replications) as under:

Silkworm strain	206-PO (Chinese)						206-MKD (Japanese)					
Batch	1	2	3	4	5	6	1	2	3	4	5	6
Mating hour	1	2	3	4	5	6	1	2	3	4	5	6
Replication	3	3	3	3	3	3	3	3	3	3	3	3
No. of pairs per replication	10	10	10	10	10	10	10	10	10	10	10	10
Laying/replication for egg counting	3	3	3	3	3	3	3	3	3	3	3	3

Eggs for each mating durations of each strain were taken on egg cards. Eggs of 9 laying per strain for each mating duration were counted to work out the extent of fecundity. The eggs were incubated at room temperature of $25 \pm 2\text{C}^\circ$ and $70 \pm 5\%$ relative humidity.

After hatching the eggs of 54 laying, 3 laying in each replication per strain, were counted for the extent of fertility of eggs.

Results and discussion

Results in respect of fecundity and fertility are given in table 1 and 2. The maximum average egg-laying capacity of 206- PO (Chinese strain) and 206-MKD (Japanese strain) was recorded as 486 and 500 eggs per female in 5 hours mating duration, respectively. However statistical analysis showed effect of all mating durations non-significant.

Table 1. Extent of fecundity of Chinese and Japanese silkworm strains

Rep.	Laying	Fecundity per female in the mating duration							
		Chinese-206 PO							
		1	2	3	4	5	6	1	2
R1	L1	440	410	460	410	351	321	513	398
	L2	513	521	474	404	514	446	472	567
	L3	480	419	474	424	475	442	410	477
R2	L1	507	450	434	396	479	547	484	428
	L2	490	431	452	484	489	486	481	415
	L3	411	482	466	523	377	380	426	478
R3	L1	531	355	319	303	637	545	466	485
	L2	493	399	506	532	640	563	555	440
	L3	399	471	402	237	417	590	513	553
Total		4270	3938	3987	3713	4379	4320	4320	4241
Average		474	437	443	412	486	480	480	471

Table 2. Extent of fertility of eggs of Chinese and Japanese silkworm strain

Mating duration (hours)	Fertility of eggs of Chinese and Japanese silkworm strain				
	Chinese-206 PO				Hatched
	Hatched	Un hatched	Total	% fertility	
1	4151	119	4270	97.2	4237
2	3793	145	3938	96.3	4010
3	3622	365	3987	90.8	3837
4	3489	224	3713	94.0	4121
5	4160	219	4379	95.0	4295
6	3928	192	4320	90.9	3981

* Sum of 9 laying in each mating duration of each strain.

The data in table revealed that one hour coupling duration proved the best by giving egg fertility of 97.2% in 206-PO (Chinese) and 98.1% in 206-MKD (Japanese). The 3 hour mating duration gave the minimum egg fertility of 90.8% and 92.4% in Chinese and Japanese strains, respectively. The extent of hatchability of eggs in all mating durations was statistically non-significant. However the values of un-hatched eggs of Chinese strains in 3 hours mating duration were highly significant.

It can be concluded that under the local climatic conditions the most suitable mating duration is 5 hours for the maximum fecundity and one hour for the maximum fertility of eggs of the locally evolved silkworm strains, 206-PO (Chinese) and 206-MKD (Japanese). However the mating durations from 1 to 6 hours are statistically non-significant, therefore, the researchers and silk seed producers can use one hour mating duration for maximum fecundity and maximum fertility of eggs.

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