

**Relationship Between Certain Measurements of Silkworm *Bombyx Mori*
L. Female Pupae and Fecundity of Moths**

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ABSTRACT

In order to determine if a measurable pupal body structure of silkworm *Bombyx mori* L. can be used as an index of female – moth reproductivity, the relation between certain measurements of the female pupae and egg production of the resulted moths was studied. The results indicated that the weight of female pupae and the length as well could be used as a reliable index of female moths fecundity.

So, such study may help the silkworm breeders in their breeding programs.

INTRODUCTION

It is well known that silkworm breeding is one of the main objectives of sericulture. The breeding aim should be set according to the progressive approach of sericulture development in a country. Amongst the important breeding aims, in addition to natural purposes of breeding for high yield and good quality of silk, the selection for the production of silkworm eggs is required for rearing which is represented in female moth fecundity.

In order to determine if a readily measurable insect body structure can be used as an index of reproductive potential, investigators have attempted to correlate certain dimensions of the female pupae and fecundity for some lepidoptans. Williams (1963) proved that there was high positive correlation between pupal weight and fecundity in *Proceras sacchariphagus*. Similarly, Kiritani and Iwao (1967) found that egg number and body length were positively correlated in *Chilo supersalis*.

Miller *et al* (1982) reported a similar positive relationship between pupal size and egg production in the giant silkworm *Antheraea polyphemus*.

The present study is an attempt to find out the relationship between certain dimensions of the female pupae and egg production in the mulberry silkworm

Bombyx mori L. in order to provide available practical information concerning the silkworm selection programs.

MATERIALS AND METHODS

The experiments were carried out using the pupal stage that had been taken from the stock culture of the Chinese hybrid 9FX of the mulberry silkworm *Bombyx mori* L. maintained under the hygrothermic conditions of 25 ± 2 °c and $78 \% \pm 4$ R.H. in Dept. of sericulture, Agricultural Research Center (ARC) Alexandria, Egypt.

To obtain the experimental female pupae, the sex discrimination was conducted at the end of the 5th larval instar according to the Ishiwata imaginal bud and Herold imaginal bud which are the larval imaginal buds for sexual organ (Krishnaswami *et al*, 1973 and Choe, 1980).

One hundred female pupae seven days old post pupation were randomly selected and weighed. In addition to body weight, the following dimensions were measured using the vernier:

- a) Body length represented in the distance from vertex of head to posterior end of abdomen.
- b) Body width of the fourth abdominal segment.

Each of the measured female pupae was kept in a numerical perforated paper bag until moth emergence. Once the moth emerged, each of sampled thirty newly emerged female moths was dissected in Pringer solution, the reproductive system was removed, spread on specimen slide glass and measured.

Randomly elected fifteen experimental female moths were allowed to mate with male moths, each couple was kept in its numerical paper bag. After oviposition, the number of deposited eggs per female moth was counted and recorded.

A Simple correlation between the above mentioned measured characters of female pupae and egg

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production was calculated. For instance, considering the relation between weight, length and width of experimental female pupae and the number of deposited eggs of the resulted female moths was studied. The relation between the measured parameters of female pupae and the length of the reproductive system of the resulted female moths was also statistically calculated.

RESULTS AND DISCUSSION

The results presented in Table, 1 clarify the calculated correlation coefficient values between the tested parameters of the female pupa and egg production of resulted female moths of silkworm *Bombyx mori* L.. Regarding the weight of female pupa and the number of deposited eggs, the strong positive relationship was detected between them ($r = 0.831$). The same highly positive correlation was found between pupal length and the number of deposited eggs ($r = 0.803$). Similarly, Kiriatain and Iwao (1967) found that egg number and body length were positively correlated in *Chilo suppressalis* (Lepidoptera).

Moreover, there was a positive correlation between pupal width and the number of deposited eggs ($r = 0.607$ Table, 1) but somewhat less than the other parameters. This result was in agreement with Jennings (1974) who found a significant relationship between abdominal width of the female pupal body and number of deposited eggs in *Rhyacimia neomexicana* (Dyar; Lepidoptera). Miller *et al* (1982) reported similar positive relationship between pupal size and egg production in the giant silkworm *Antheraea polyphemus*.

The illustrated results in Table, 2 show the highly strong positive correlation between both of estimated parameters of pupal weight and/or pupal length; and the length of the reproductive system of the resulted female moths ($r = 0.966$ and 0.817 , respectively).

From all the above mentioned results it could be concluded that the weight of female pupae of *B. mori* and the length as well can be used as a reliable index of female moths fecundity. Such study may help the silkworm breeders to select for one desirable character, which is difficult to estimate on the basis of another easily measurable correlated.

Table 1. Relation between female pupal measurements and egg production in *Bombyx Mori* L.

Tested character	X1	X2	X3	X4
X1				
X2	0.837			
X3	0.574	0.575		
X4	0.831	0.803	0.607	

X1 = weight of pupa
X3 = width of pupa
 $r = 0.349$

X2 = length of pupa
X4 = number of deposited eggs
d.f. = 30

Table 2. Relation between female pupal measurements and the length of reproductive system of resulted moths.

Tested character	X1	X2	X3	X4
X1				
X2	0.764			
X3	0.768	0.613		
X4	0.966	0.817	0.762	

X1 = weight of pupa
X3 = width of pupa
 $r = 0.381$

X2 = length of pupa
X4 = length of reproductive system
d.f. = 25

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الملخص العربي

العلاقة بين بعض مقاييس العذارى الإناث لديدان حرير القز وخصوبة الفراشات

وجيهة حسين يحيى - منى ماهر محمود

قسم بحوث الحرير - مركز البحوث الزراعية - إسكندرية

طول جهازها التناسلي من الممكن أن يكون مؤشرا لخصوبة الفراشات. و على ذلك فإن مثل هذه الدراسات يمكن أن تساعد مرببي ديدان حرير القز في برامج التربية.

للتعرف على ما إذا كان بعض مقاييس جسم العذراء يمكن استخدامه كمؤشر للخصوبة، فقد تمت دراسة العلاقة بين وزن وطول و عرض العذارى الإناث و كمية البيض الناتجة من الفراشات. و أوضحت النتائج أن وزن العذراء الأنثى و كذلك