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Rearing and feeding of larvae of *Bombyx mori* Linn In laboratory conditions

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Abstract

Lepidoptera larvae are good experimental materials to observe growth phenomenon.In the present study relationship between quality and consumption of leaves and larval rearing have been depicted .

Key Words: ***Lepidoptera, Larvae, Silkworm***

Introduction

Lepidopteran larvae are know as more or less continuous feeders hence, a deficiency in the amount of food required for reaching its full potential will be manifested in various ways (Wouldbaver 1968). Shortening of feeding periods for larvae of different insects have resulted in the prolongation of larval periods and decrease in final body weight (Mc Girimis and Kasting 1969), which in turn may affect reproductive success or resulting adults particularly where adult females do not feed. Shrivastava *et al* 1982 reported extension of larval period up to 2 days and decrease in the fecundity to the extent of 32% Eri silk moth, *Philosamia ricini*.

Material and Methods

Lepidoptera larvae are good experimental materials to observe growth phenomenon. The growth and reproduction are separate phases in the life cycle of Silkmoth. Providing nutritional mulberry leaves to the larvae is an essential component of sericulture solubility, as to get good quality and improved cocoon and Silk thread. The larval feeding especially 4^{th} and 5^{th} in star are very important because the

larva only feed on leaves and grow. The whole phenomenon of larval feeding completes within few days only and one has not to wait for months and years to complete experiment, their smaller size makes them manageable objects and the entire experimentation can be conducted by controlled situation with petridishes, wooden trays and other material.

The growth of silk moth larvae in relation to food consumption and in relation to ecological factors such as light, temperature and humidity have been studied in detail with reference to the growth and production of cocoon solubility as to make the problem more result oriented.

Taxonomic Position of Silkmoth

Mulberry silk worm, *Bombyx mori* is a homometabolous insect and passes through four morphologically stages in its cycle Viz. egg, larva, pupa and adult.

In first stage, the embryo grows and develops into a larva's. The second is a Vegetative Stage, in which the larva takes nutrients i.e. mulberry leaves. Mulberry leaves are the sole food for larvae in commercial sericulture and the quality and quantity of the mulberry leaf feed during rearing decide the success of Silkworm crop. Hence, choice of mulberry leaves suitable for healthy growth of Silk worm is one of the most important factor in sericulture. The 4^{th} is metamorphic stage in which the larva becomes pupa and then in to the adult. The fourth stage of cycle is known as reproductive, stage in which moth mates and the female moth lay eggs producing next generation. It is only the larval stage that the silk worm takes foods, grows enormously and accumulates nutrition for the moth stage, the life cycle of silk moth was under laboratory condition and following stages were studies by Chawky methods the eggs were procured from "Seri Culture Centre" district Raisen, Madhya Pradesh.

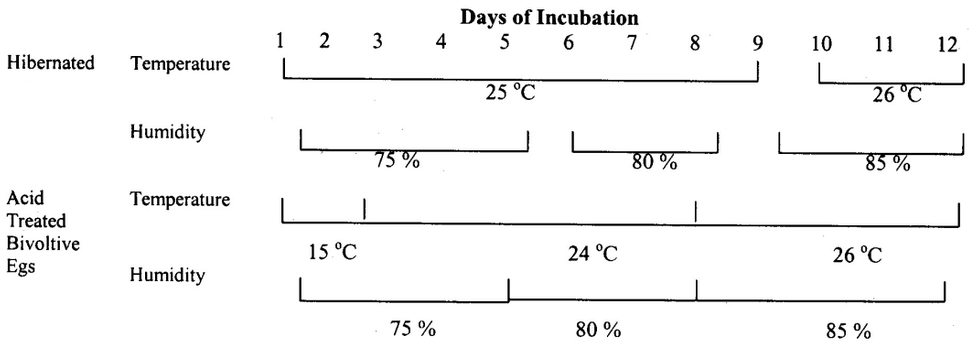
Laboratory culture of Silk moth eggs and larvae

Silkworm eggs are brought from sericulture centre were sterilized by dipping in 2% formaline solution for about 10 minutes and dried in shade before incubation. The incubation period as recorded for bivoltine and hibernating bivoltine eggs in room with temperature 25^{o} C, RH 80% + 5% and keeping the photoperiod L:D 16:8. The data recorded for proper incubation of eggs are given in the table 1. The data show that average incubation period varies between 11-12 days. It was also observed that two days before hatching, the colour of the eggs start changing into lighter shade with a blue point, the very next day colour of eggs changed into blue. This is the pigmentation stage. Eggs were kept in dark room or covered with black paper or cloth. The following technical cares need to be followed as emerged from the experimentation in the present study.

(A) **Maintenance of Temperature**

a. 20-28°C is the optimum range of temperature for Silk worm rearing
b. 25 C is temperature which favored healthy growth of late instar larvae.
c. It was noticed that maximum optimum range of temperature for different instar as mentioned in Table 2 varies from 20 to 28 °C.
d. It was observed that for young larvae upto 3rd instar a slightly higher range of temperature is required where as in last stages i.e. for 4th and 5th instar a little less as shown in the Table 2.

Table 1. Showing range of temperature and humidity required during incubation period days of Incubation



(B) **Humidity** It was noticed that relative humidity needed, for ideal rearing of silk worm larvae ranged between 80 to 90% for younger instar, a slightly higher humidity was needed while for older, less humidity is required as shown is table 2. It was maintained by using Honey well Humido-state in the insectary.

(C) **Light** Silkworm larvae attains maximum growth in dimlight and was found to avoid strong light. The minimum photoperiod of light required for larval rearing was noticed to be 16:14

hours night/day. This was maintained by automatic switch 'On and Off' device available in the insectory. All these conditions were maintained in the insectery established long back at Pest Control Research Laboratory at Vidisha.

(D) **Spacing of worm's in the rearing beds** This is another important aspect of sericulture. Optimum rearing bed over from brushing to the end of larval stage is important to attain full larval growth and yield of good quality cocoon. The data collected for proper spacing have been cited in table 3 with spacing, regular cleaning was also felt necessary. Cleaning was done during 2nd instar, first on the next day of resumption of feeding and the next before the worms prepare for second moult in the 3rd instar also. Two cleaning is sufficient, first after second moult and second before setting for third moult. The larvae reared on good quality leaves were found grown to 10 thousands time more, than the weight of the newly born larvae within 24 to 25 days.

Table 2. Temperature and humidity required during early instar rearing

Particulars	1st Instar	2nd Instar	3rd Instar
Temperature	28 °C	27 °C	26 °C
Humidity	85-90 %	85 %	80 %

Table 3. Showing spacing during rearing of larval Instar of *Bombyx mori*

Age of larvae	Area Required for rearing		Increase in Spacing during Each Instar (times)
	In beginning (Sqft)	At the End (Sqft)	
1st Instar larvae	4	15	3 ½
2nd Instar larvae	15	41	3
3rd Instar larvae	41	105	2 ½
4th Instar larvae	105	210	2
5th Instar larvae	210	400	About 2

Results and Discussion

A detail study was carried out as regards the feeding and rearing of *Bombyx mori* in the insectary maintained at Pest Control Research laboratory of the Institution. It was noticed that mulberry leaf feed during rearing decides the success of silk worm crop. The similar views have been expressed in several manual of Silk worm rearing specially.F.A.O. Bulletin 1988. It has been observed that young larval instar needs more care and attention because they are more susceptible to diseases. Of the total leaf consumed, 6.36% was found to be utilized by early stages i.e. from 1st to 3rd instar larvae. For the proper growth and metamorphosis of the larvae of silk moth, proper feeding is required as mentioned in the table (1 to 5). Besides proper feeding to the larvae, proper spacing in rearing beds and clearing is also needed to be taken care of. Larvae reared, on in crowded condition showed poor growth. Rajan *et al* 1996 have mentioned that rearing of young larval instar of *B.mori* needs special attention. They have mentioned further that not giving proper spacing to the larvae may affects cocoon quantity and yield of fibers. Similar views has been expressed by Saxena 2000.

In the present study relationship between quality and consumption of leaves and larval rearing have been depicted in the tables (4 & 5). It took about 24 to 26 days for completing the larval cycle in *Bombyx mori* under controlled laboratory conditions which are slightly different (< 2 days) as mentioned by Nath *et al* 1990.

Table 4.Contents of Starch and Water in Mulberry leaves

Contents	**Harvesting time**	
	06=00	**18=00**
Sugar	0.490	0.921
Starch	0.707	2.043
Water	82.11	74.01

Table 5.Showing frequency of Bed cleaning during rearing of *Bombyx mori*

Instar	Before moulting	Inter mediate period	After moulting
1st Instar	1	-	-
2nd Instar	1	-	1
3rd Instar	1	1	1
4th Instar	-	1-2	1
5th Instar	-	Once a day	

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