

# BIOLOGY OF DERMESTID BEETLE, *DERMESTES ATER* DEGEER (COLEOPTERA: DERMESTIDAE) ON BIVOLTINE DOUBLE HYBRID (FC1 AND FC2) MULBERRY COCOON

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**ABSTRACT :** In mulberry sericulture *Dermestes ater* (Degeer) has been reported as pest of mulberry silkworm which feeds on pierced cocoons, pupae, dead and egg laying moths. The laboratory experiment was carried out in the Silkworm Seed Production Centre (SSPC), Hosur, Tamil Nadu to study its biology. The results revealed that the average fecundity was  $202.20 \pm 14.46$  eggs, incubation period was  $4.35 \pm 0.87$  days and total grub period was  $34.64 \pm 0.95$  days. The pupa was oval shaped and light yellow in colour. The pupal period ranged from 7.05 to 8.01 days with an average of  $7.49 \pm 0.33$  days. The average longevity of adults was  $11.95 \pm 2.21$  days. The total life cycle of the dermestid beetle (egg to adult emergence) occupied 43.03 to 48.32 days with a mean of  $46.48 \pm 1.68$  days.

**Key words :** Biology, mulberry, cocoon and *Dermestes ater* (Degeer).

## INTRODUCTION

The cultivation of mulberry (*Morus* sp.) is an age old agricultural practice for production of silk cocoons through rearing silkworms. Sericulture is known for its low investment, quick and high returns and is an ideal and viable enterprise which fits well into socio-economic conditions of India. Mulberry growing and production of cocoons is entirely an agricultural activity, whereas unwinding of silken thread from cocoons and weaving of the fabric form an industrial superstructure. Mulberry leaf plays a dominant role as a source of nutrition to *Bombyx mori* L. in cocoon production. A large number of insect pests are known to infest mulberry in varying intensity during different stages of the crop and season.

On the other hand various pests are known to attack and cause severe damage to the stored mulberry cocoon rendering them unfit for reeling. The coleopteran pest *Dermestes ater* is a major pest known to attack the pierced cocoons in the cocoon storage rooms. These places serve as breeding centers for the beetles in the grainage. The beetles from the pierced cocoon storage rooms migrate and damage the green cocoons and also inflict damage to the moths. Thiagarajan and Govindaiah (1987) recorded a loss of about 20% of the silk production due to Dermestid beetles. The estimated loss due to detmestid beetle to green cocoons and moths in mulberry

is 16.62 and 3.57, respectively (Veer *et al*, 1996). So far no systematic studies have been done with respect to *D. ater* biology on bivoltine double hybrid (FC1 and FC2) mulberry cocoon as it is important to know the life cycle of an insect so that management mechanisms may be incorporated at the most susceptible stage of the life cycle. Therefore, a study was conducted under laboratory conditions and the findings of the present study would help in managing this pest.

## MATERIALS AND METHODS

Studies on biology of the insect was carried out under laboratory conditions at the Silkworm Seed Production Centre (SSPC), National Silkworm Seed Organization, Central Silk Board, Hosur (Tamil Nadu) during 2019 as per the techniques adopted by Siddaiah and Kujur (2016) with slight modifications.

In order to study the biology of *D. ater* the grubs and adults were collected in large numbers from the grainage of SSPC, Hosur. They were cultured in the laboratory to collect the eggs to study the biology. The eggs were kept in glass petridishes on the blotting paper. The eggs were observed daily for hatching. On emergence the grubs were transferred to clean transparent plastic jars covered with muslin cloth to facilitate aeration. The bivoltine double hybrid (FC1 and FC2) mulberry dead silk moth, cocoon shell, dead pupa and floss were provided as food

**Table 1:** Biological study of dermestid beetle, *Dermestes ater* on Bivoltine mulberry cocoon

S. No.	Life stages	Duration (days)	
		Range	Mean $\pm$ SD
1.	Fecundity	180 – 225	202.20 $\pm$ 14.46
2.	Incubation period	3.29 – 6.00	4.35 $\pm$ 0.87
3.	Grub period		
	First instar	2.15 – 3.05	2.57 $\pm$ 0.33
	Second instar	3.02 – 4.15	3.46 $\pm$ 0.46
	Third instar	4.00 – 5.00	4.35 $\pm$ 0.36
	Fourth instar	5.15 – 6.12	5.60 $\pm$ 0.37
	Fifth instar	18.00 – 19.20	18.67 $\pm$ 0.40
	Total grub period	32.69 – 36.52	34.64 $\pm$ 0.95
4.	Pupation period	7.05 – 8.01	7.49 $\pm$ 0.33
5.	Adult longevity	8.12 – 13.69	11.95 $\pm$ 2.21
6.	Total life cycle (egg to adult)	43.03 – 48.32	46.48 $\pm$ 1.68

for the developing grubs. These grubs were observed daily for the presence of exuviae from which the duration of instar was noted in days. The grubs were further observed for pupal development in order to calculate the pupal period. Each pupa was observed until adult emergence and then, was used for recording adult longevity. Finally, the total developmental period from egg laying to adult emergence was worked out.

### RESULTS AND DISCUSSION

The fecundity range was 180 to 225 eggs with an average of  $202.20 \pm 14.46$  days. The freshly laid eggs of *D. ater* were small, round and creamy white in colour. As the incubation period advanced, the eggs turned to pale yellow. The incubation period ranged from 3.29 to 6.00 days with an average of  $4.35 \pm 0.87$  days. The grub developed through five instars. The newly hatched grub was milky white in colour and the colour of grubs gradually turned darker after each moult. The duration of first instar varied from 2.15 to 3.05 with an average of  $2.57 \pm 0.33$  days. The second, third, fourth and fifth instar lasted for 3.02 to 4.15 days with a mean of  $3.46 \pm 0.46$  days, 4.00 to 5.00 days ( $4.35 \pm 0.36$  days), 5.15 to 6.12 days ( $5.60 \pm 0.37$  days) and 18.00 to 19.20 days ( $18.67 \pm 0.40$  days), respectively. The pupal period ranged from 7.05 to 8.01 days with an average of  $7.49 \pm 0.33$  days. The pupa was oval shaped and light yellow in colour. The longevity of adult varied from 8.12 to 13.69 days with an average of  $11.95 \pm 2.21$  days (Table 1). The adult beetle was oblong and black in colour.

The total lifecycle of the dermestid beetle (egg to adult emergence) occupied 43.03 to 48.32 days with a mean of  $46.48 \pm 1.68$  days. The present findings are in close agreement with Roth and Willis (1950) wherein they observed that the life cycle takes about 6 weeks at 27 to 28°C. Kumar *et al* (1988) reported that eggs hatched within 3 to 6 days, the larval period lasted for 27 to 28 days and the pupal period 7 to 8 days at room temperature. The findings are also in close conformity with the observations of Siddaiah and Kujar (2016).

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