EFFECT OF DIFFERENT MATURITY MULBERRY LEAVES ON BIOLOGY OF BIVOLTINE SILKWORM (*Bombyx mori* L.)

ABSTRACT

The studies on effect of different maturity mulberry leaves on biology of bivoltine silkworm (*Bombyx mori* L.) revealed that the shortest larval duration (23.82 days), pupal duration (10.67 days), highest fecundity (566.67 eggs), highest hatching percentage (94.67 per cent) and significantly highest moth emergence (97.67 per cent) was observed when silkworm larvae fed on tender mulberry leaves as compared to medium, coarse and mixed mulberry leaves.

KEY WORDS: Larval duration, Pupal duration, Fecundity, Hatching percentage, Moth emergence

INTRODUCTION

The role of mulberry leaves is pivotal in maximizing cocoon products during commercial rearing and ensuring fecundity in seed cocoon rearing (Miyashita, 1986). When cultivating mulberry for silkworm cocoon production, the objective should not only be to increase leaf yield per unit area but also to ensure the leaves quality, facilitating the optimal utilization of the leaf crop produced (Sarkar, 2020). The development of silkworm larvae and the economic characteristics of cocoons are significantly influenced by the nutritional quality of the mulberry leaves they consume (Krishnaswami, 1978). *Bombyx mori* L. predominantly consumes mulberry leaves and exhibits a preference for leaves at various maturity levels,

such as tender, medium, and mature, depending on its larval stage (Sarkar, 2020). The biochemical composition also varies with leaf maturity, including top tender, middle mature, and bottom mature leaves. There is a consensus that tender leaves, characterized by their higher nutrient content, are nutritionally superior and contribute to a more productive silkworm crop compared to matured leaves (Narayanan et al., 1967). The higher moisture content in mulberry leaves is particularly noteworthy as it directly impacts the growth and development of the silkworm (Paul et al., 1992). Benchamin and Jolly (1986) noted that silkworm larvae show a preference for leaves with high moisture content and lower dry matter. Previous research has consistently highlighted the nutritional richness of top tender leaves compared to medium, matured, and over-matured leaves, emphasizing their lower pubescence density and blunt tip (Rangaswami et al., 1976; Sinha et al., 1993; Bongale et al., 1997; Trivedi et al., 2008).

MATERIALS AND METHODS

The experiment was conducted during monsoon 2020-21 at Department of Agricultural Entomology, College of Agriculture, Latur under Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra to study the effect of different maturity mulberry leaves on biology and economic traits of bivoltine silkworm (*Bombyx mori* L.). It was conducted in randomized block design with seven treatments and three replications using FC2 X FC1 bivoltine double hybrid silkworm race. One hundred silkworm larvae were reared in each replication. The disease free layings were used to feed on the leaves of mulberry variety V-1. The mulberry branches divided into three regions, namely top tender (high moisture 75-80%), middle medium (moisture content 65-75%) and bottom coarse leaves (low moisture 60-65%).

The treatment details are as follows the treatment T_1 is feeding with tender leaves, the treatment T_2 is feeding with medium leaves, the treatment T_3 is feeding with coarse leaves, the treatment T_4 is feeding with tender + medium leaves, the treatment T_5 is feeding with tender + coarse leaves, the treatment T_6 is feeding with medium + coarse leaves and the treatment T_7 is feeding with tender + medium + coarse leaves.

The improved technology of silkworm rearing described by Krishnaswami (1978) was followed in the present investigation. The disease free layings of the Double Hybrid silkworm (FC_2 X FC_1) were kept for hatching in laboratory. After hatching of the eggs the chawki worms were brushed as per the treatments. They were separated into rearing trays into three replications as per treatments. The mulberry leaves as per the treatments were chopped and sprinkled over the worms. The bed was made in a uniform size as per space required to the worms. The quantity of food, spacing and cleaning were done as per the stage of worms and their requirement. The disinfectants used were formalin 2% solution, bleaching powder 0.3%, lime powder and Vijetha powder. The equal quantity of food on the basis of weight as per treatment was given to the larvae for feeding. The chopped mulberry leaves were fed to the larvae 3 times in a day at 8.00 am, 2.00 pm and 6.00 pm. The size of the chopped leaves was regulated according to condition and size of the worm. During moulting period the worms were not fed with any food and they were not disturbed. After completion of each moult, a bed disinfectant Vijetha @ 4 kg/100 Dfl's was dusted as per recommendation after passing every moult for the prevention of diseases and feed was given after half an hour and after each moulting bed cleaning was done by removing waste material from the tray with the help of cleaning nets. The quantity of food was increased as per the growth of the silkworm. After the full development of the worms they were released on mountages for spinning cocoons. Treatment wise harvesting of cocoon was made on fifth day of release of worms on the mountages.

The total larval period was measured by recording period from the date of hatching to the onset of spinning. The total pupal period was measured by recording the period from spinning to the date of emergence of moth. The observations on the number of moths emerged from cocoon was recorded and it was expressed in percentage (Moth emergence = Number of moths emerged/ Total number of cocoons x 100). The fecundity of each treatment was computed by taking number of eggs laid by female after mating. Empty whitish egg shells were counted immediately after brushing, which indicated the emergence of larvae. The late born larvae, unhatched and unfertilized eggs were also counted and computed.

RESULTS AND DISCUSSION

The effect of feeding different maturity leaves of mulberry on the larval duration of bivoltine silkworm (*Bombyx mori* L.) (Table 1) revealed that T_1 (feeding on tender leaves) had the shortest larval duration (23.82 days) however, it was at par with T_2 i.e. feeding with medium leaves (24.78 days), T_4 i.e. feeding with tender + medium leaves (24.30 days) and T_6 i.e. feeding with tender + coarse leaves (24.61 days) and T_7 i.e. feeding with tender + medium + coarse leaves (24.83days). The longest larval duration was noticed in treatment T_3 i.e. feeding with coarse leaves (25.38 days) and was at par with treatment T_5 i.e. feeding with medium + coarse leaves (25.10 days). The results obtained in the present investigation are in conformity with the results obtained by Dharma Naik (2001), Krishnaprasad et al., (2003), Rahamathulla et al., (2003), Rahmathulla et al., (2006), Kundgar et al., (2015) and Kale et al., (2017).

The data (Table 1) showed that the pupal duration was observed in the range of 10.67 to 11.50 days. The treatment T_1 (Feeding with tender leaves) recorded lowest pupal duration (10.67 days) and it was at par with T_4 i.e. feeding with tender + medium leaves (10.93 days). The longer pupal duration (11.50 days) was recorded in T_3 (Feeding with coarse leaves)

however, it was at par with T_5 (Feeding with medium + coarse leaves) (11.30 days). The results obtained in the present investigation are in conformity with the results observed by the Kundgar et al., (2015) and Kale et al., (2017) also observed the shortest pupal duration when silkworm fed with tender leaves.

The results (Table 1) indicated that emergence of silk moth varied from 84.67 to 97.67 per cent. The significantly highest moth emergence (97.67 per cent) was observed in T_1 i.e. feeding with tender leaves. The significantly lowest moth emergence (84.67 per cent) observed in T_3 i.e. feeding with coarse leaves. The results obtained in the present investigation are in conformity with the results observed by Ritabasu et al., (1995), Krishnaprasad et al., (2002 b), Kundgar et al., (2015) and Kale et al., (2017).

The fecundity data (Table 1) indicated that the fecundity ranged from 442.33 eggs to 566.67 eggs. The larvae fed on tender leaves (T_1) had the highest fecundity (566.67 eggs), which was at par with treatment T_4 i.e. feeding with tender and medium leaves (553 eggs). The lowest fecundity was noticed in T_3 i.e. feeding with coarse leaves (442.33 eggs) and it was at par with treatments T_5 i.e. feeding with medium + coarse leaves (462.67 eggs) and T_6 i.e. feeding with tender + coarse leaves (471.67 eggs). The results obtained in the present investigation are in conformity with the results observed by Singh et al., (1994), Krishnaprasad et al., (2002 a), Krishnaprasad et al., (2002 b), Kundgar et al., (2015) and Kale et al., (2017) they observed the highest fecundity when silkworm fed with tender leaves.

The hatching percentage ranged from 85.33 per cent to 94.67 per cent (Table 1). The treatment T_1 i.e. feeding on tender leaves recorded highest hatching percentage (94.67 per cent) however, it was at par with hatching percentage recorded in T_4 i.e. feeding with tender + medium leaves (92.33 per cent). The lowest hatching percentage (85.33 per cent) was found in treatment T_3 i.e. feeding on coarse leaves and was at par with treatment T_2 (89.33

per cent) i.e. feeding with medium leaves. The results obtained in the present investigation are inline with the results observed by the Ritabasu et al., (1995), Krishnaprasad et al., (2002 a), Krishnaprasad et al., (2002 b), Kundgar et al., (2015) and Kale et al., (2017). leaves.

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Table 1: Effect of feeding different maturity leaves of mulberry on the biology of bivoltine silkworm (*Bombyx mori* L.).

Treatment. No.	Treatment details	Larval duration (days)	Pupal duration (days)	Moth emergence (%)	Fecundity	Hatching (%)
T_1	Feeding with tender leaves	23.82	10.67	97.67 (81.40)*	566.67	94.67 (76.62)*
T_2	Feeding with medium leaves	24.78	11.00	93.33 (75.07)	478.33	89.33 (70.91)
T_3	Feeding with coarse leaves	25.38	11.50	84.67 (66.98)	442.33	85.33 (67.47)
T_4	Feeding with tender + medium leaves	24.30	10.93	95.33 (77.61)	533.00	92.33 (73.42)
T_5	Feeding with medium + coarse leaves	25.10	11.30	92.00 (74.45)	462.67	89.67 (71.28)
T_6	Feeding with tender + coarse leaves	24.61	11.17	94.00 (75.92)	471.67	91.33 (72.89)
T_7	Feeding with tender +medium + coarse leaves	24.83	11.07	94.33 (76.66)	517.33	90.67 (72.78)
	S.E. ±	0.353	0.091	1.130	11.210	1.140
	C.D. at 5%	1.087	0.281	3.520	34.538	3.553
	C.V. (%)	2.48	1.43	2.594	3.91	2.733

*figures in parentheses are angular transformed values