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STUDY ON PERFORMANCE OF TASAR SILKWORM, *ANTHERAEA MYLITTA* DRURY UNDER DIFFERENT CHAWKI REARING METHODS

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ABSTRACT
Chawki rearing is one of the vital activities in silkworm rearing, which enables the farmers to reap good harvest of quality cocoons. Conventional chawki rearing practice using nylon net widely exists among the tasar farmers for tasar chawki rearing. However, since, this practice involving higher cost, tasar farmer are could not afford to adopt chawki practice in tasar sericulture. Hence, the study was examined with the objective of the access the performance of tasar silkworm under different viable chawki rearing methods which can easily adopt by tasar tribal farmers. The study revealed that the tasar silkworm larva grown under Jar method had performed better in respect to food habits and larval growth and development followed by the cage rearing method. However, when considering in large scale rearing of chawki silkworm Jar method is question. So, this jar method can be adopted in small scale, particularly, experimental purpose. Whereas, cage method for Tasar chawki rearing can be recommended who is practicing in large scale extensively.

KEYWORDS: Arjun, Chawki, Feeding habits, Morphology, Tasar.

INTRODUCTION

Tasar culture a forest-based industry reared mostly by tribal population involves crop loss due to parasites, predators and climatic vagaries. The Tasar silkworm, *Antheraea mylitta* Drury (Daba TV) is a commercial and wild sericigenous insect, exists in nearly 17 states of our country in the form of 44 ecological populations (ecoraces) or biotypes, *viz.*, Daba (Jharkhand), Munga (Jharkhand), Modal (Orissa), Sukinda (Orissa), Bhopalpatnam (Chhattisgarh), Piprai (Madhya Pradesh), Tira (West Bengal), Bankura (West Bengal), Monga (Uttar Pradesh), Tesera (Rajasthan), Jiribam (Manipur), Raily (Chhattisgrah), Boko (Assam), Andhra (Andhra Pradesh), Sukinda, Bagai, Sarihan (Jharkhand), Medipatho (Meghalaya) and Bhandara (Maharastra) etc. This tasar sericulture is a subsidiary occupation and livelihood with tribal inhibiting in and around the forest of Jharkhand, Bihar, MP, Odisha, WB, UP, AP and Maharashtra for production stages seeds cocoon, yarn, fabric. The tribal remain associated with cocoon collection initially and later with cocoon production through plant rearing in the forest patches.

Sericulture activities are agro-based and the industrial sector. The agro-based part involves mulberry cultivation and silkworm rearing. In Silkworm rearing, Chawki is considered as one of the important stage from which a successful cocoon crop is ensured. The first three instars are highly sensitive and require at most care for their growth and development. Chawki rearing needs optimum environmental conditions which can sustain the outbreak of silkworm disease avoiding crop failures during late age rearing (Bedford, 1944; Jolly, 1986). Various factors have shown to affect the success of silkworm cocoon production including environment (37%), leaf quality (38.2%), rearing technique (9.3%), silkworm race (4.2%), silkworm egg quality (3.1%) and others (8.2%) (Mukul Deka, 2011). Chawki rearing is one of the vital activities in silkworm rearing, which enables the farmers to reap good harvest of quality cocoons. In order to stabilize tasar silk production and increase income from tasar culture, tasar silkworm rearing methods need considerable improvement, as outdoor rearing of wild silkworm exposes the larvae to the vagaries of climatic conditions and also make them more vulnerable to pests and diseases. Young age (chawki) silkworms suffer extensive damage to predators as cited above. A surer way of preventing silkworm crop loss is to conduct indoor rearing against vagaries losses of silkworm. Earlier, many endeavours were made to conduct indoor rearing of tasar silkworm but did not yield the desired result. Several workers made efforts towards chawki rearing (rearing of first III instars) to prevent the loss of early age of tasar silkworms. However, success of tasar silkworm under indoor method is limited.

In the present investigation, an attempt has been made for chawki indoor rearing of *Antheraea mylitta* Drury (Daba TV), in which first and second instars rearing of silkworm was carried out from brushing stage to the second instars complete in the controlled conditions with an objective of decrease the silkworm mortality and provide nutritional leaves to young stage silkworm.

MATERIALS & METHODS

Description of the Study Area

Study area is situated in the Piska-Nagri, district of Ranchi, Jharkhand state. Lying between 22^{o} 30' and 24^{o} 30' N Latitude and between $83^{o}22^{'}$ and 85^{o} 06' E Longitude at an altitude of 651 meters above MSL. The region enjoys a humid to sub-tropical climate and receives a mean annual rainfall of 1323.00 mm in 100 rainy days.

Of this, nearly about 85 per cent is received during south - west monsoon (2nd week of June – 1st week of October), 7.78 per cent during North East monsoon (2nd week October – 3rd week of December), 2.87 per cent during winter (January-February) and 7.48 per cent during summer (March -May). The maximum temperature ranges from 29.3 °C to 36.2 °C and the minimum temperature ranges from 4.5 °C to 19.8 °C.

Experimental Details

The rearing of Tasar silkworm, *A. mylitta* D., is conducted a in the indoor conditions with *T. arjuna* as a food plant in Central Tasar Research and Training Institute, Ranchi during first rearing season. The experiment was consisted three different indoor rearing methods for rearing chawki larva. This indoor rearing method includes cage, jar and tray methods. The cage rearing method prepared by bamboos was split into small thin pieces upto 2.5 feet long, with help of knife. This bamboo sticks then tied with each other with the help of iron wire or thread and it was finally made a box type of square cage (all the side are equal length) with the size of each cage 2.5x2.5x2.5 feet. Thereafter, the cage was covered with the polythene sheet around the cage except cage bottom and holes were made. The bottom of the cage was tied with nylon net to facilitate for the collection of litters and excreta larvae (Fig.1a). The leaf twigs were placed at top of the cage to feed the silkworm (Fig.1b). Whereas, tray rearing method was prepared by Arjun or Asan shoots with leaves were placed in trays and the worms were fed tender leaves with shoot twice a day i.e., morning and evening. Bed cleaning was done once a day. In this method, wet foam pad strips and paraffin papers/polythene sheets have been used at the bottom and top to maintain conducive environment.

(a) (b)

(c) (d)

FIGURE 1: Tasar silkworm rearing performance on (a) external view of cage rearing (b) internal view of cage rearing (c) Jar rearing (d) Tray rearing methods during the experimental period

The trays kept in wooden stand with a capacity to accommodate 7 trays. The size of the rearing room was 3x3 meters size that 42 trays with rearing capacity of 504 dfls can be reared (Fig. 1c). Similarly, jar rearing method prepared by newly hatched larvae were brushed on the leaves of cut twigs of Asan (*Terminalia tomentosa*) or Arjun (*Terminalia arjuna*) in a jar. The size of two feet length leaf twigs are inserted in a bottle containing water. The twigs were then covered with a polythene bag supported by a bamboo frame. One end of the polythene

was tied around the bottle neck and the other to a support. On each such set, worms hatched from 1-5 dfls could be reared. A shelter with size of 3x6 meter size could accommodate 90 such sets in two tiers, which can accommodate brushing of 300-400 dfls (Fig. 1d). Brushing was taken upto three days continuously during morning by giving fresh leaves to larvae concurrently, numbers of twigs also increased as per requirement. In this experiment each cage was accommodated 7-10 dfls depends up on hatching percentage. Dried twigs were removed after third day. So, larva after second instars have been transferred to main filed for late age rearing, however, in this study, observations were examined till second instars completed.

RESULTS & DISCUSSION

Feeding and cleaning of chawki bed

The experimental study was started with seven Dfls,s in each cage, jar and tray rearing systems upto end of chawki stage of *A. mylitta* larvae. The chawki stage larvae were fed with *Terminarlia arjuna* (Arjun) plant leaves. In present study, the number of feedings under different rearing system has been varied depending upon availability of leaf moisture content and freshness of leaves. Number of feedings given to larvae under cage and Jar rearing systems on morning hours were eight and six times, respectively (Fig. 2). However, number of feedings under tray methods was eight times with two times each day i.e. morning and evening; so, totally 16 times were fed leaves to *A. mylitta*. Feeding of leaves to chawki larva has been stopped during end of moulting period in all three rearing systems. In jar rearing method, number of feeding given to larva was maximum due to moisture freshness of leaves was existed longer times than any other rearing methods. Whereas, number of feedings was more under tray method due to since leaf twigs are easily exposed to ambient temperature could cause quickly dried so every day both morning and evening times had to change the leaves.

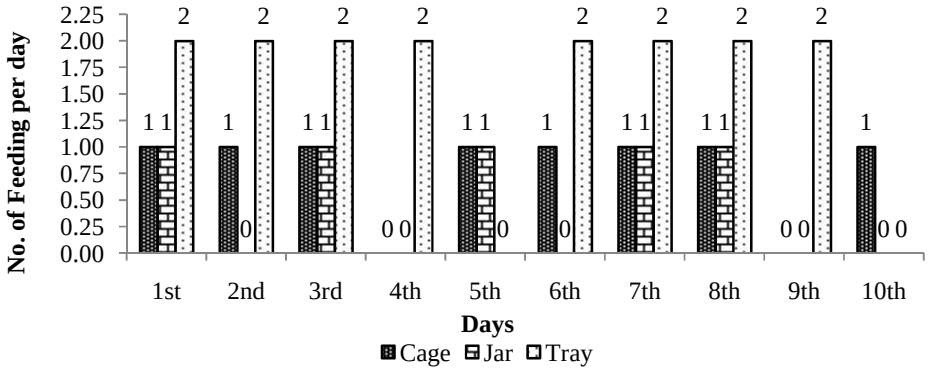

FIGURE 2. Number of feeding given to *Antheraea mylitta* silkworms under Cage, Jar and Tray rearing systems of chawki stage during experimental period

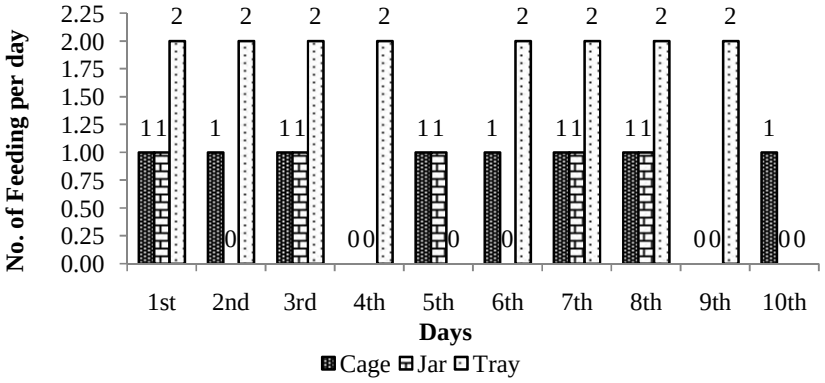

FIGURE 3. Number of cleanings followed after feeding given to *Antheraea mylitta* silkworms under Cage, Jar and Tray rearing systems of chawki stage during experimental period

Similarly, cleaning of dry twigs in cage, jar and tray rearing methods is presented in Fig. 3. Like feeding of larva, cleaning of dry twigs in rearing systems was also less in cage and jar rearing methods as compared to tray method. Both cage and jar rearing methods were not varied in respect to cleaning of rearing beds. However, number of cleaning days was more under tray rearing methods and it required the cleaning on each day to maintain hygiene and disease free environment during whole chawki stage rearing.

Morphological growth

Data showing in Table 1 that morphological growth of tasar silkworm is varying upon different rearing methods. The length of tasar silkworm larva during chawki stage had recorded maximum under Jar rearing system than cage and tray methods. Silkworm grown under jar method

recorded 19 and 38 mm during I and II instars, respectively. Whereas, length of larva in cage rearing method was 17 and 36mm and in tray rearing method was 15 and 34 mm during I and II instars, respectively.

TABLE 1. Morphological growth of *Antheraea mylitta* grown under different indoor rearing methods of chawki stage during experimental period

Stages	Cage rearing		Jar rearing		Tray rearing	
	Length (mm)	Weight (mg)	Length (mm)	Weight (mg)	Length (mm)	Weight (mg)
1st (at end of the stage)	17	65	19	67	15	61
2nd (at end of the stage)	36	494	38	496	34	453

Similarly, different rearing methods had influenced on tasar silkworm weight. In present investigation, larval weight was observed more under jar rearing than other rearing methods. Jar rearing method had recorded 67 and 496 mg during I and II instars, respectively. While, larval weight of tasar silkworm in cage rearing was 65 and 494 mg and in tray method 61 and 453 mg during I and II instars, respectively. The higher larval length and weight under Jar method might be due to availability of fresh and higher moisture content leaves throught the period could be increased higher larval length and weight. However, in cage and tray systems, leaves have exposed to open environment could cause moisture loss from the leaves and decrease the availability of fresh leaves. The same finding also corroborated by Agarwal and Seth (1999) reported that succulent and nutritious leaves major role in higher growth of tasar silkworm. The above result was also confirmed by Rai *et al*., (2006).

CONCLUSION

From the above results it could be concluded that tasar silkworm grown under different rearing methods for chawki silkworm stage is influencing on feeding habits and morphological growth of silkworm larva. Tasar silkworm larva grown under Jar method had performed better in respect to food habits and larval growth and development followed by cage rearing method. However, when considering in large scale rearing of chawki silkworm Jar method is question. So, this jar method can be adopted in small scale particularly, experimental purpose. In this large scale situation, cage rearing method for chawki larva can be recommended to farmers who practicing in extensively. Therefore, the cage rearing method of chawki tasar silkworm could be economically feasible, locally available and technically viable.

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