WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.074
Volume 7, Issue 15, 668-675. Research Article ISSN 2277– 7105

RELATIVE IMPACT OF DIFFERENT METHODS OF LARVAL CULTURE ON THE PRODUCTIVITY AND QUALITY OF TASAR SILKWORM, *ANTHERAEA MYLITTA* D. (SATURNIIDAE: LEPIDOPTERA)

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Article Received on
10 June 2018,

Revised on 30 June 2018,
Accepted on 21 July 2018

DOI: 10.20959/wjpr201815-12984

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ABSTRACT

The present paper presents a relative picture in respect of Indoor, Outdoor and food transfer methods of larval culture of indigenous tasar silkworm, *Antheraea mylitta* D. On the effective rate of rearing (E.R.R.%), cocoon weight, shell weight and shell ratio related to productivity and quality of tasar cocoons of *A.mylitta* D. The results obtained are indicative of the fact that the different methods of larval culture of tasar silkworm have significant impact on its rearing performances in respect of quantitative and qualitative characters of tasar. The observation reveals that larval culture of tasar silkworm under outdoor conditions on the foliages of its host plant is relatively better than indoor and food transfer methods as far as the productivity and quality of tasar cocoons are concerned. Food transfer method of larval culture from primary to secondary and vice-versa has resulted into relatively inferior rearing performances as compared to outdoor and indoor methods of larval culture of *A.mylitta* D. The results obtained are probably due to evident differences in the conditions, essentially required for the larval culture of tasar silkworms and it is very much in conformities with the earlier works carried out by sericologists.

KEYWORDS: Tasar silkworm, *Antheraea mylitta*, sericologists.

INTRODUCTION

Sericigenous insects are famous for the production of natural silks viz; mulberry, tasar, eri and muga of great commercial importance. The different species of *Antheraea frith*i Mr; *Antheraea roylei* Moore; *Antheraea proylei* Jolly; *Antheraea yamamai* Guer. and *Antheraea mylitta* Drury are well known for producing the tasarsilk in the tasar producing belts of different countries at global level. Among these *Antheraea mylitta* D. is the principal tasarsilk producing indigenous insect so called "Indian Tasar silkworm". It is usually reared on the foliages of primary (*Terminalia arjuna*, *Terminalia tomentosa* and *Shorea robusta*) and secondary (*Terminalia catappa*, *Terminalia chebula*, and *Terminalia belerica*, etc.) tasar host plants in the forest areas during the seed crop (July-August) and commercial crop (September-October) seasons. The tasar silkworms observe eight months pupal diapause under unfavorable environmental conditions. It is wild, bivoltine/multivoltine and polyphagous.

At present various methods of tasarculture such as outdoor, indoor, food transfer method and culture of tasar worms on artificial diets are practiced in view of better and desired tasar crop in respect of productivity and quality of tasar cocoons as well as tasar silk yarn. However, a comparative evaluation of different methods of tasar culture has not yet been studied as a result we fail to understand the relative effect of said methods in relation to rearing performances of *A.mylitta*. In view of said fact present investigation has been designed to test the relative impact of different methods of larval culture of tasar silkworm. *A. mylitta* in the larger interest of tasar culture.

Review of Literatures

Review of literatures are indicative of the fact that attempts have been taken to understand the rearing performances of tasar silkworm under the different methods of larval culture. Jolly (1971) conceived an idea of "Indoor rearing" of tasar culture to protect the larvae from the natural vagaries of traditional outdoor method of larval culture in the forest areas of tropical tasar belts. Further, Jolly etal.(1973) reported that the Indoor larval culture of tasar worms resulted in to better productivity (E.R.R.%) without affecting the quality of tasar cocoons. Jolly (1985) reported species differentiation of genus Antheraea. Choudhari etal. (1987) mentioned that the indoor rearing of *Antheraea mylitta* D. Under the controlled conditions lessened the rate of larval mortalities resulting in to relatively better rate of productivity of tasar cocoons as compared to conventional outdoor method of rearing. Rath etal.(1999)

reared the tasar silkworm, *Antheraea mylitta* D. on different primary and secondary tasar host plants and found that the rearing performances of tasar silkworms are relatively better on the primary tasar food plants as compared to secondary tasar food plants on account of significant differences in nutrient contents in the foliages of two different categories of host plants. Sinha etal.(2000) worked on the impact of "Interchange of food plants" method between primary and secondary host plants of tasar silkworm and investigated that the relative rate of consumption of foliages at latter stages(IVth and Vth) of larval culture of *A.mylitta* is relatively greater than the culture of tasar silkworm at initial stages(Ist to IIIrd). They further reported that larval rearing of indigenous tasar silkworms by the interchange of food plants method for the larval culture of tasar silkworm. Shamitha (2007) reported successful Indoor rearing of tasar silkworm under the laboratory by regulating the required conditions. Thangavelu etal.(1990) also reported the feasibilities of Indoor method of larval culture of tasar silkworm on account of protection from the vagaries of nature against the outdoor usual practice of tasar culture. Sharma etal.(2013) reported the significant impact of environmental factors on the Indoor rearing performances of *Antheraea mylitta* D. Kumar etal.(2017) reported the relative impact of some factors on the coupling behavior of indigenous tasar silkworm.

Arora etal.(1979) carried out detailed studies on the taxonomic status of Indian non-mulberry silk moths. Bindroo etal.(2007) studied the relative impact of host plants on the behavioural manifestation of eri silkworm and found that the dietary variations have significant impact on the quantitative and qualitative characters of eri silkworm. Krishnaswamy (1978) presented new technology of silkworm rearing. Mishra (2014) reported significant role of foliar constituents on the growth and development of tropical tasar silkworm. Kumar (2016) mentioned variation in the free amino acid contents in the larval haemolymph of *Antheraea mylitta* in relation to dietary changes.

MATERIALS AND METHODS

A set of 100 freshy hatched larvae of *Antheraea mylitta* divided in to five replications (20 x5) were brushed on the foliages of *Terminalia arjuna* tasar host plant under outdoor and Indoor conditions of larval culture. A part from this a set of 100 larvae with five replications were mounted on the foliages of primary host plant *T.arjuna* upto IIIrd stages and thereafter transferred to secondary host plant *Terminalia belerica* and vice-versa. Thus the four sets of larvae divided into five replications were evaluated under outdoor, indoor and food transfer

methods in respect of rearing performances of indigenous tasar silkworm as per the methods suggested by Jolly(1971) and Krishnaswamy (1976).

The Indoor method of larvae culture involves the rearing the larvae on cut branches of host plant inserted in water filled earthen pots under the controlled laboratory conditions. Tasar silkworm rearing was conducted on *Terminalia arjuna*, primary tasar host plant and *Terminalia belerica* the secondary tasar host plant by providing tender and mature foliages to freshy hatched larvae till the formation of cocoons. Tasar cocoons were harvested separately as per different methods of tasar culture considered for their relative impact on their rearing performances. The data on the rearing performances and quality of cocoon were carefully assessed and analyzed and thereafter presented in table with histogram.

RESULTS AND DISCUSSIONS

Results obtained in relation to relative impacts of outdoor, indoor and food transfer methods of larval culture of *Antheraea mylitta* D., the tropical indigenous tasar silkworm on the larval weight, effective rate of rearing (E.E.R.%), average cocoon weight, shell weight and shell ratio have been recorded in the table 1. Table clearly reveals that the larval culture of *A.mylitta* D. under Indoor (Larval wt.30gm., E.R.R.69.0%, cocoon wt.11.48gm., shell wt.1.82gm. and shell ratio 10.76%), outoor (Larval wt.41.0gm., E.R.R.62.0%, cocoon wt.12.85gm., shell wt.2.01gm. and shell ratio 12.56%), transfer of food from primary to secondary food plant (Larval wt.18.0gm., E.R.R.26.0%, cocoon wt.10.02gm., shell wt.1.39gm. and shell ratio 8.12%), and transfer food from secondary to primary food plant (Larval wt.35.0gm., E.R.R.58.0%, cocoon wt.11.84gm., shell wt.1.90gm. and shell ratio 10.98%), methods present significant variation among themselves as far as the productivity and quality of tasar cocoons are concerned. Further the results are indicative of the fact that the percentage of effective rate of rearing (E.R.R.%) of *A.mylitta* under indoor rearing as compared to outdoor rearing is relatively better. However, the quality of cocoon under indoor larval culture is inferior than the outdoor rearing. As far as the impact of transfer of food technique is concerned the rearing performances of tasar larvae initially reared on secondary food plant and there after transferred to primary food plant are relatively better to its vice-versa in respect of productivity and quality of tasar cocoon of *A.mylitta*.

The better productivity (E.R.R.%) of tasar cocoons under indoor condition than the outdoor condition of larval culture of *A.mylitta* is probably on account of the fact that the larvae are more protected under Indoor condition from the pests, predators and also from the Vagaries

of nature (Jolly, 1973). However the quality of tasar cocoon is relatively better under outdoor condition as compared to indoor condition because of the fact that tasar larvae due to wild nature prefer outdoor natural conditions for their desired metabolic and behavioural manifestations. Tasar larvae do not get properly acclimatized with indoor artificial conditions to accept domestication in view of natural instinct inherited for outdoor conditions (Sharma etal.2013).

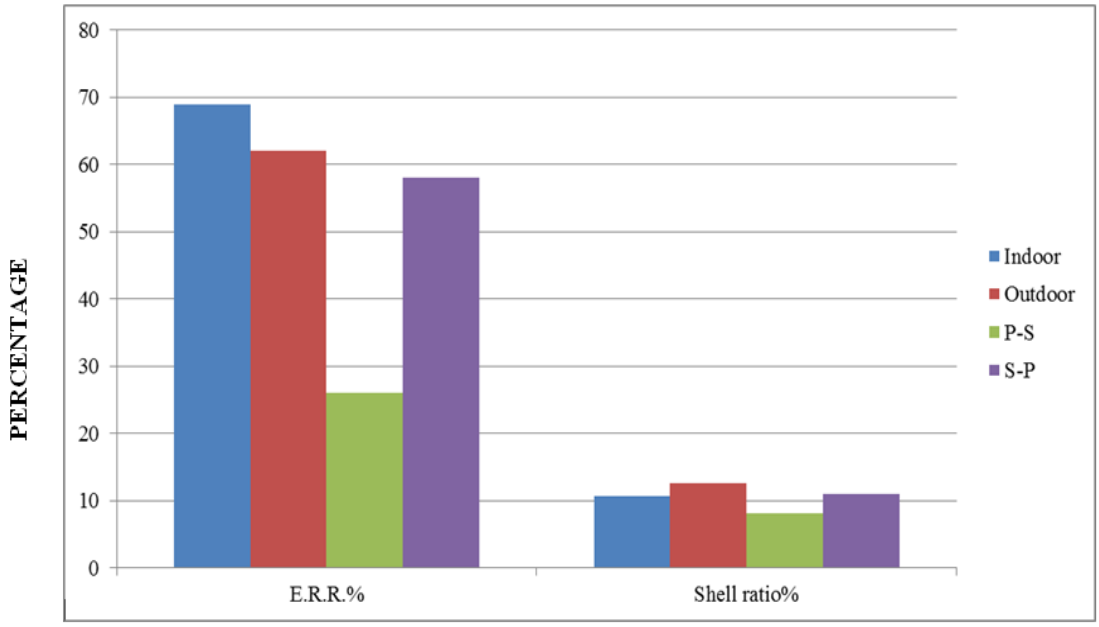
Results obtained further reveal that the larval culture of tasar silkworm initially on the foliages of secondary food plant and thereafter transferred to foliages of primary host plant as compared to its vice-versa under the interchange of food plants technique of larval culture has resulted into better productivity and quality of tasar cocoons of *A.mylitta*. The relative variation in relation to impact of two dietary conditions on the quantitative and qualitative characters of tasar appears to be the outcome in the differences between the nutrient contents of primary and secondary food plants of tasar silkworm. Kumar (2016) has mentioned that foliages of primary food plants as compared to secondary food plants have greater biochemical constituents with better nutrient value essentially required for the growth and development of tasar silkworm. Rath etal. (1999) reported that rate of consumption of foliages by tasar larvae at initial stages (Ist to IIIrd) is very less than the rate of consumption of foliages at latter stages(IVth & Vth) of larval culture of tasar silkworm. It is thus very clear that the tasar larvae require more quantity of rich diet at latter stages than the initial stages of tasar culture. Therefore, the results so obtained are very much in conformities with the earlier investigations carried out by Jolly (1973), Sharma etal. (2013), Kumar (2016), Rath etal. (1999) and many other sericologists.

Table 1: Table showing relative performances of *Antheraea mylitta* D. under three different methods of tasar culture.

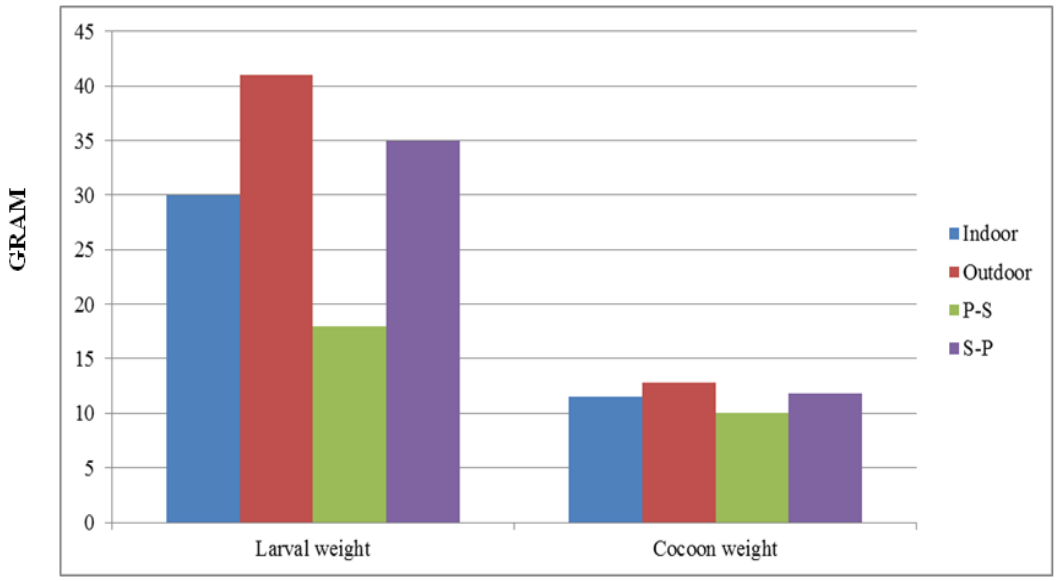
Sl No.	Methods of Larval Culture	AV Larval weight (gm)	AV. E.R.R. (%)	AV. Cocoon weight (gm)	AV. Shell weight (gm)	AV. Shell ratio (%)
1.	Indoor rearing on *T.arjuna* host plant	30.0	69.0	11.48	1.82	10.76
2.	Outdoor rearing on *T.arjuna* host plant	41.0	62.0	12.85	2.01	12.56
3.	Initial rearing upto IIIrd stage on *T.arjuna*(P) and then after on *T.belerica*(IVth & Vth stages)(s)	18.0	26.0	10.02	1.39	8.12

	(P-S) Food transfer method					
4.	Initial rearing upto IIIrd stage on *T.belerica*(S) and then after transferred to *T.arjuna*(P) upto IVth & Vth stages (S-P) Food transfer method	35.0	58.0	11.84	1.90	10.98
	Mean	31.0	53.75	11.54	1.78	10.60
	C.D. at 5% level	**	**	*	*	*

E.R.R. = Effective rate of rearing
P =Primary host plant
S = Secondary host plant
** = Highly significant
* = Significant



Histogram 1: Showing relative impact of four different methods of larval culture of A.mylitta on the effective rate of rearing and shell ratio.



Histogram 2: Showing relative impact of different methods of larval culture of A.mylitta on the larval weight and cocoon weight.

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