Altitudinal and Seasonal Effects on the Growth of Fifth Instar Larva of *Antheraea mylitta* Drury (Satrurniidae) Feeding on Different Food Plants

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Abstract

Antheraea mylitta Drury is a polyphagous, semi domesticated tropical tasar silk insect which feeds on a number of food plants available in the forest. The fifth instar larva is the most crucial stage for growth and post larval life. So, the growth parameter like length, breadth weight of fifth instar larva was evaluated in different seasons at different altitudes. Significantly the highest values of growth parameters were recorded in the larvae raised on Asan (*Terminalia alata* W.&A.) food plant at both the lower and medium altitudes during autumn season as well as at lower altitude during winter season. Basing on growth performance of the fifth instar larvae of *A.mylitta*, the eight good plants considered for study during autumn season at both the lower and medium altitudes were graded in the order Asan> Sal> Arjun > Ber> Sidha> Dha> Bahada> Jamun. However, the eight food plants chosen for study during winter season at lower altitude were graded in the order Asan> Sal> Arjun > Ber> Sidha> Dha> Bahada> Jamun on the basis of larval growth performance.

KEYWORDS: *Antheraea mylitta*, energy budget, host plant, instar, *Terminalia alata*

INTRODUCTION

The tropical tasar silk insect *Antheraea mylitta* Drury, being polyphagous in nature, has a number of food plants in which the larva feeds on their leaves and spends the entire larval and post larval life. The tasar farmers rear the larvae of *Antheraea mylitta* for production of cocoon crops. During rearing activity, very often acute shortage of food plants is experienced causing a setback to quantity of cocoon production and silk yield. Commonly the food plants like Asan (*Terminalia alata* W.&A.), Arjun (*Terminalia arjuna* W. & A.) and Sal (*Shorea robusta* Gaerten) are considered as primary food plants, although huge number of other food plants like Ber (*Ziziphus jujube* Gaertn), Sidh (*Lagerstoemia parviflora* Roxb), Bahada (*Terminalia belerica* (Gaertn) Roxb) and Jamun (*Syzygium cumini* (L.) Skeels) are available near the rearing field. But no concrete literature is available giving information on the economics of cocoon crop of *Antheraea mylitta* raised on such unutilized food plants.

Studies have already been conducted on the cocoon crop performance of *Antheraea mylitta* reared on few more food plants like Ber (*Ziziphus jujube* Gaertn), Sidh (*Lagerstoemia parviflora* Roxb) and Dha (*Anogeissus latifolia* Wall) at lower altitude (Dash et al., 1992). Besides, literatures are also available on morphology of the larva (Narasimhanna and Jolly, 1969; Narasimhanna et al., 1969), voltinisim of *A. mylitta*

(Nayak et al., 1992), starvation stress on larva (Dash et al., 1988) larval energetic in different food plants (Nayak et al., 1988a), domestication of larva (Nayak et al., 1988b), larval leaf consumption on Asan (Nayak et al., 1985; Rath et al., 2003), but no information is available on growth of larva feeding on different primary and unutilized secondary food plants at different altitudes in different seasons. So the present investigation was carried out in order to assess the growth of larva in different food plants at different altitudes and seasons for proper gradation of food plants.

MATERIALS AND METHOD

From each of the eight categories, a number of food plants having identical growth were selected at random for rearing of larvae of *A. mylitta*. The food plants were chosen at two different altitudes i.e. lower altitude (50-300 m ASL) and medium altitude (301-600 m ASL). The rearing of the larvae was carried out in each food plant at lower altitude during autumn and winter seasons and at medium altitude during autumn season only, since *A.mylitta* behaves as bivoltine here. The growth of fifth instar larva was assessed in terms of length, breadth and weight in each food plant. The data so obtained was statistically analyzed by using t-test and ANOVA test (Sokal and Rohlf, 1969).

RESULTS

In autumn season at lower altitude the growth of mature fifth instar larva of *A.mylitta* in terms of length (cm), breadth (cm) and weight (gm) was assessed. The highest value in terms of length (11.72±0.05), breadth (1.87±0.01) and weight (33.91±0.91) was observed in Asan food plants (Table 1). The lowest growth in length (8.37±0.12), breadth (1.02±0.03) and weight (16.13±1.04) was observed in Jamun food plants (Table 1). The t-test indicated significant ($p<0.05$) difference in growth in terms of length, breadth and weight of the larvae raised on different food plants. The ANOVA test showed significant ($p<0.01$) interaction between the food plants and the growth parameters of fifth instar larvae reared at lower altitude in autumn season. The gradation of the food plants in terms of growth parameters of larvae of *A.mylitta* in autumn season at lower altitude was in the order Asan> Sal> Arjun > Ber> Sidha> Dha> Bahada> Jamun.

During autumn season at medium altitude, the growth of mature fifth instar larva in terms of length (cm), breadth (cm) and weight (gm) was compared. The highest larval growth in terms of length (13.87±0.08), breadth (2.07±0.02) and weight (38.23±0.97) was recorded in Asan food plant (Table 2). The lowest growth in length (9.46±0.12), breadth (1.12±0.05) and weigh (19.53±1.36) was noted in Jamun food plant. Significant ($p<0.05$) difference in growth in terms of length, breadth and weight of larvae reared in different food plants was observed from t-test. The ANOVA test also indicated significant ($p<0.01$) interaction between the food plants and growth parameters of fifth instar larva raised at medium altitude in autumn season. Considering all the growth parameter, the gradation of the food plants in autumn season at medium altitude was in the order Asan> Sal> Arjun > Ber> Sidha> Dha> Bahada> Jamun.

Likewise, at lower altitude in winter season, the growth in terms of length (cm), breadth (cm) and weigh (gm) of mature fifth instar larva was analyzed. The highest value of larval growth in terms of length (12.60±0.04), breadth (2.12±0.02) and weight (38.43±0.94) was noted in Asan food plant (Table 3). The lowest growth of the larva in length (8.87±0.08), breadth (1.11±0.04) and weight (20.64±1.78) was observed in the

food plant Jamun. The t-test indicated significant ($p<0.05$) difference in all the growth parameters of larvae grown on the different food plants. The ANOVA test also showed significant ($p<0.01$) interaction between the food plants and growth of fifth instar larva at lower altitude in winter season. The gradation of the food plants in terms of larval growth in winter season at lower altitude was in the order Asan> Sal> Arjun > Ber> Sidha> Dha> Bahada> Jamun.

From the above observation it was found that the growth of mature fifth instar larva in terms of length, breadth and weight at lower altitude during autumn and winter seasons and at medium altitude during autumn season only was the highest in Sal food plant and the lowest in the Jamun food plant (Fig. 1, Fig.2 & Fig. 3).

Discussion

The growth of mature fifth instar larva in terms of length, breadth and weight in autumn season at both the lower and medium altitudes as well as at lower altitude in winter season was observed to be the highest in Asan food plant. This shows the superiority of Asan plant among all the food plants. It might be due to better nutritional supplement obtained from Asan leaf for growth of larva favored by optimum climatic conditions. Jolly et al. (1974) reported superior growth parameters of tasar cocoon crops raised in Sal food plants. Dash et al. (1992) recorded superiority of Sal for cocoon crop parameters (weight of cocoon, pupa & shell) in lower altitude in rainy season only; whereas superiority of Asan was observed during autumn and winter season in the same altitude.

The present investigation showed considerable results of larval growth parameters on food plants like Ber, Sidha, Dha and Bahada. Jolly (1966) reported that Asan, Arjun and Sal food plants are of primary importance. But this study indicates consideration of Ber, Sidha, Dha and Bahada for rearing activities of *A.mylitta* larva when there is inadequacy of primary food plants like Asan, Arjun and Sal in the rearing field without hampering much the economics of cocoon crop. Dash et al. (1992) reported appreciable cocoon crop performances in the food plants of Asan, Arjun, Sal, Ber, Sidha and Dha, although they are graded as secondary food plants by jolly (1966). Here the growth performance on Bahada food plants indicates encouraging results for its utilization at the time of scarcity of food plants. But the larval growth performance was unsuitable in Jamun food plants at both the lower and medium altitudes during autumn season as well as at the lower altitude during winter season. Further investigation on the above growth parameters at other stages of the insect may be carried out in order to draw concrete conclusion.

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Table 1: Growth of fifth instar larva of *Antheraea mylitta* reared in different food plants at lower altitude during autumn season

Food Plants	Length (in cm)	Breadth (in cm)	Weight (in gm)
Asan	11.72±0.05	1.87±0.01	33.91±0.91
Arjun	11.51±0.03	1.76±0.03	29.09±0.64
Sal	11.59±0.04	1.81±0.02	31.27±0.78
Ber	11.46±0.03	1.71±0.01	28.82±0.56
Sidha	11.14±0.08	1.43±0.03	24.19±0.82
Dha	10.98±0.06	1.34±0.02	23.87±0.23
Bahada	10.22±0.09	1.19±0.04	21.36±0.67
Jamun	8.37±0.12	1.02±0.03	16.13±1.04

Table 2: Growth of fifth instar larva of *Antheraea mylitta* reared in different food plants at medium altitude during autumn season

Food Plants	Length (in cm)	Breadth (in cm)	Weight (in gm)
Asan	13.87±0.08	2.07±0.02	38.23±0.97
Arjun	13.24±0.07	1.82±0.01	34.51±0.74
Sal	13.52±0.04	1.93±0.02	36.44±0.81
Ber	12.86± 0.06	1.76±0.01	32.62±0.63
Sidha	12.18±0.04	1.58±0.03	27.47±0.88
Dha	11.83±0.07	1.47±0.04	26.86±0.34
Bahada	11.02±0.03	1.31±0.03	23.38±0.72
Jamun	9.46±0.12	1.12±0.05	19.53±1.36

Table 3: Growth of fifth instar larva of *Antheraea mylitta* reared in different food plants at lower altitude during winter season

Food Plants	Length (in cm)	Breadth (in cm)	Weight (in gm)
Asan	12.60±0.04	2.12±0.02	38.43±0.94
Arjun	12.43±0.03	1.95±0.03	34.80±0.61
Sal	12.02±0.05	1.87±0.01	32.37±0.73
Ber	11.91±0.03	1.78±0.01	34.21±0.57
Sidha	11.33±0.06	1.54±0.04	29.56±0.62
Dha	11.16±0.05	1.39±0.03	27.32±0.58
Bahada	10.54±0.04	1.28±0.02	25.48±0.46
Jamun	8.87±0.08	1.11±0.04	20.64±1.78

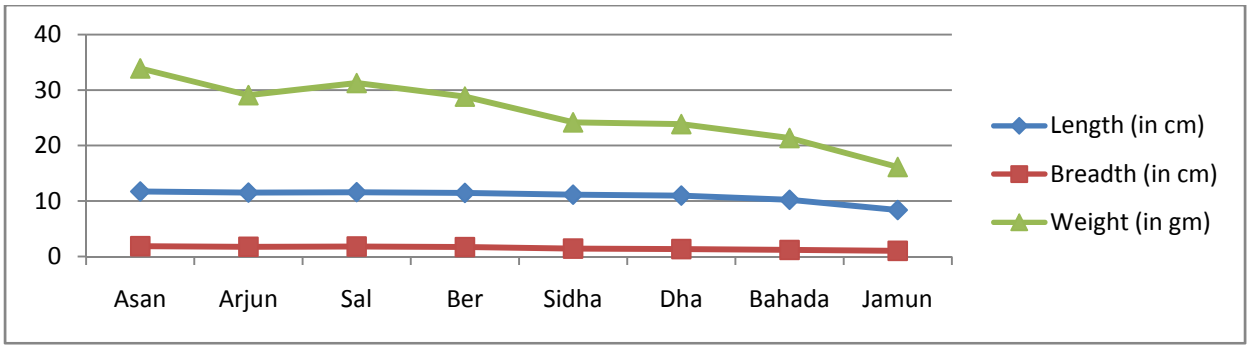

Figure 1 Growth of fifth instar larva of *Antheraea mylitta* reared in different food plants at lower altitude during autumn season.

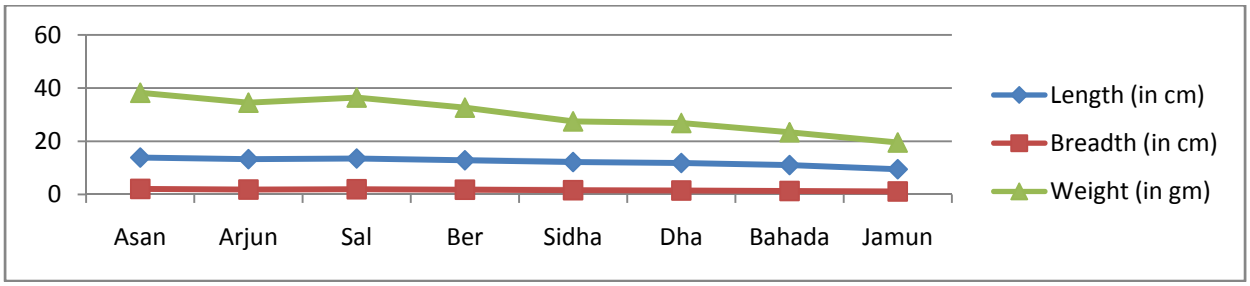

Figure 2 Growth of fifth instar larva of *Antheraea mylitta* reared in different food plants at medium altitude during autumn season

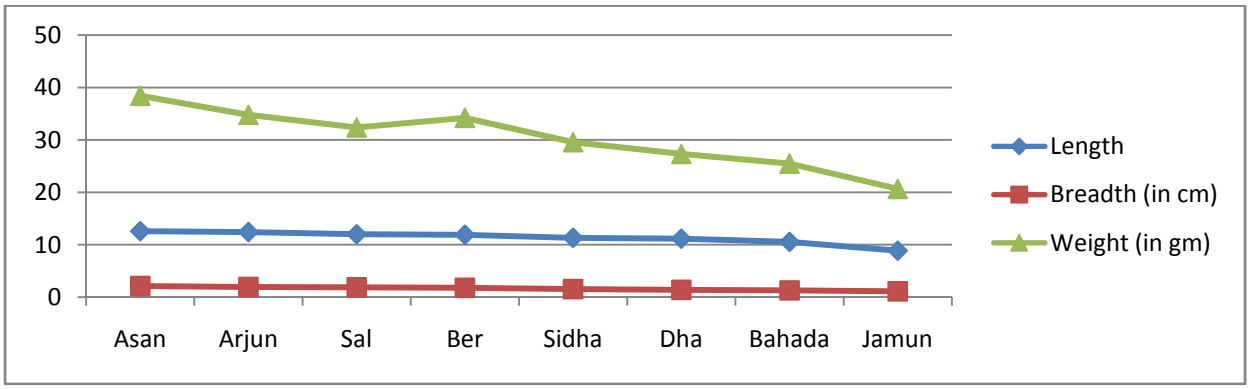

Figure 3 Growth of fifth instar larva of *Antheraea mylitta* reared in different food plants at lower altitude during winter season