AD EDUXIAN JOURNAL
A Quarterly Multidisciplinary Blind Peer Reviewed & Refereed Online International Journal
Google Scholar Indexing PIF: 1.048(I2OR) & 3.125 (IIFS)
Vol (3), Issue (1), January-March 2026 *ISSN: 3048-7951*

Influence of Species Diversity on the Behavioural Traits of Tropical Tasar Silkworm (Antheraea mylitta)

Sujata Kumari[1] & Dr Dilip Kumar Keshri[2]
DOI: https://doi.org/10.5281/zenodo.18940746
Review: 04/02/2026 **Acceptance: 04/02/2026** **Publication: 10/03/2026**

Abstract
Species diversity plays an important role in shaping the behavioural responses and ecological performance of insects. The present study investigates the influence of species diversity on the behavioural traits of the tropical tasar silkworm (Antheraea mylitta). The study was conducted under natural rearing conditions in tasar-growing areas where different host plant species were available. Key behavioural parameters such as feeding behaviour, resting pattern, locomotion and host plant preference were observed and recorded during different larval instars. The results revealed significant variations in behavioural patterns in relation to species diversity and host plant availability. Larvae exhibited higher feeding frequency and activity levels in habitats with greater plant diversity. The findings suggest that species diversity positively influences the behavioural adaptability of tasar silkworms and may contribute to improved survival and growth. This study highlights the ecological significance of biodiversity in sustaining tasar sericulture and insect adaptation.
Keywords: Tasar silkworm, Antheraea mylitta, species diversity, behavioural traits, host plant, ecological adaptation

Introduction:

Tropical tasar silkworm (Antheraea mylitta) is an important wild silkworm species widely distributed in the forest regions of India. It plays a significant role in the rural economy through tasar sericulture. The growth, survival and productivity of tasar silkworms are strongly influenced by ecological conditions and biodiversity present in their natural habitat. Species diversity within forest ecosystems provides a variety of host plants and microhabitats that affect insect behaviour and adaptation. Behavioural traits such as feeding preference, movement pattern, resting behaviour and host selection are important indicators of ecological adaptation in insects. Variations in plant diversity may influence larval feeding efficiency, growth and survival.

Previous studies have highlighted the importance of host plant quality and environmental factors on the performance of tasar silkworms. However, limited information is available on how species diversity influences the behavioural responses of Antheraea mylitta. Therefore, the present study aims to examine the behavioural manifestations of tasar silkworm in relation to species diversity under natural ecological conditions.

Objectives

a. To study the behavioural traits of tropical tasar silkworm (Antheraea mylitta).
b. To evaluate the influence of species diversity on larval behaviour.
c. To analyze host plant preference and activity patterns in different ecological conditions.

Materials and Methods

Study Area

The study was conducted in tasar-growing forest regions where natural populations of Antheraea mylitta occur. The area consisted of mixed vegetation including major host plants such as Terminalia arjuna, Terminalia tomentosa, and Shorea robusta.

Experimental Design

The present investigation was carried out to study the comparative impact of species diversity on the performance of different tasar silkworms of the genus Antheraea: namely; A. mylitta, A. frithi, A. paphia, A. roylei, A. pernyi and A. proylei. These species, distributed under diverse agro-climatic conditions of India and adjoining regions, represent significant

[1]Research Scholar, Department of Zoology, Magadh University, Bodh Gaya, Bihar (India), Email:drsujatakumari036@gmail.com
[2]Professor, Department of Zoology, Magadh University, Bodh Gaya, Bihar (India), E-mail: drdkkeshri@gmail.com

variability in their biological, physiological, and biochemical traits. The study aimed to evaluate their relative performance in terms of rearing, breeding, reeling, and biochemical composition to identify superior traits useful for hybridization and genetic improvement in tasar sericulture. The experiments were conducted under the standard protocol likewise:

- AOAC. (1990). Official Methods of Analysis. Association of Official Analytical Chemists, 15th Edition, Washington, D.C.
- AOAC. (1995). Official Methods of Analysis. 16th Edition. Association of Official Analytical Chemists, Washington, D.C.
- Dubois, M., Gilles, K. A., Hamilton, J. K., Rebers, P. A., & Smith, F. (1956). Colorimetric method for determination of sugars and related substances. Analytical Chemistry, 28, 350–356.

All the experimental program was conducted at the Department of Zoology , Magadh University Bodh Gaya under controlled and natural environmental conditions conducive to Tasar silkworm growth. The study was divided into five major experimental modules, corresponding to the work plan components. Larvae of Antheraea Mylitta were reared under natural field conditions. Behavioural observations were recorded during different larval instars.

Behavioural Parameters Observed

The following behavioural traits were recorded:

- Behaviour Parameter
- Observation Method
- Feeding behaviour
- Frequency and duration of feeding
- Resting behaviour
- Duration of inactivity
- Locomotion
- Movement activity on host plants
- Host plant preference
- Selection among available host plants

Data Collection

Observations were recorded at regular intervals during the larval stage. Behavioural responses were documented visually and through field notes.

Statistical Analysis

Collected data were analyzed using descriptive statistics and comparative analysis to determine variations in behaviour under different levels of species diversity.

Biochemical Parameters and Analytical Methods

The following biochemical constituents were estimated from haemolymph samples:

Estimation of Free Amino Acids

The total and individual free amino acids were determined using High-Performance Liquid Chromatography (HPLC) following the standard method of Moore and Stein (1954) with minor modifications.

- Haemolymph samples were first deproteinized using 10% trichloroacetic acid (TCA) and centrifuged.
- The supernatant was filtered through a 0.22 µm membrane filter and derivatized using phenyl isothiocyanate (PITC) for amino acid profiling.
- The derivatized samples were analyzed using a Shimadzu HPLC system with a C18 reverse-phase column under gradient elution conditions.
- Quantification of amino acids was achieved by comparing peak areas with standard amino acid profiles.

- A total of nine amino acids were quantified—Aspartic acid, Glutamic acid, Alanine, Glycine, Serine, Threonine, Tyrosine, Arginine, and Valine. The results were expressed as µg/mg haemolymph.
- Estimated by Ninhydrin colorimetric method (Moore & Stein, 1948).
- Absorbance was recorded at 570 nm, and amino acid concentration was expressed as µg/mg protein using glycine as standard.

Total Carbohydrates

Determined by Anthrone method (Hedge & Hofreiter, 1962). 0.1 ml of haemolymph was mixed with anthrone reagent, boiled for 10 minutes, and absorbance recorded at 620 nm. Results expressed as mg glucose equivalent/ml haemolymph.

Total Protein

Measured using Lowry's method (Lowry et al., 1951). Bovine Serum Albumin (BSA) was used as standard, and absorbance was taken at 660 nm.

Lipid Content

Total lipids were extracted using chloroform–methanol (2:1 v/v) method (Folch et al., 1957). After evaporation of solvent, lipids were quantified gravimetrically and expressed as mg/ml haemolymph.

Moisture Content

Determined by drying 100 mg of fresh larval tissue at 80°C for 24 hours in a hot air oven and calculating the percentage loss of weight.

$$\text{Moisture (\%)} = \frac{\text{Fresh Weight} - \text{Dry Weight}}{\text{Fresh Weight}} \times 100$$

This percentage loss in weight represents the **moisture content of the larval tissue**.

Statistical Analysis

All experimental data were subjected to statistical analysis using standard procedures.

Descriptive Statistics: Mean ± Standard Error (SE)

Inferential Statistics: One-way ANOVA for comparing means among species.

Post-hoc analysis: Duncan's Multiple Range Test (DMRT) to assess interspecies differences at $p < 0.05$.

Correlation Studies: Pearson's correlation coefficients were computed to determine associations between biochemical traits and rearing/reeling performance.

Software Used: SPSS version 25.0 and Microsoft Excel 2025.

Graphical representation was prepared to visualize inter-species variations in performance and biochemical composition.

Statistical Analysis

Collected data were analyzed using descriptive statistics and comparative analysis to determine variations in behaviour under different levels of species diversity.

Results

The observations indicated that species diversity had a noticeable influence on the behavioural traits of Antheraea mylitta larvae.

Feeding Behaviour

Larvae showed higher feeding activity in areas with greater host plant diversity. Increased availability of suitable foliage enhanced feeding frequency.

Locomotion Activity

Movement activity was relatively higher in heterogeneous habitats where larvae explored different host plant species.

Resting Behaviour

Resting duration was slightly lower in diverse habitats, indicating higher activity levels among larvae.

- Host Plant Preference
- Host Plant
- Feeding Preference
- Terminalia arjuna
- High
- Terminalia tomentosa
- Moderate
- Shorea robusta
- Low

Table 1: Behavioural Activity in Different Larval Instars

Instar	Feeding Activity	Movement Activity
I	Low	Low
II	Moderate	Moderate
III	High	Moderate
IV	Very High	High
V	Maximum	High

Figure 1 shows variation in feeding activity across larval instars.

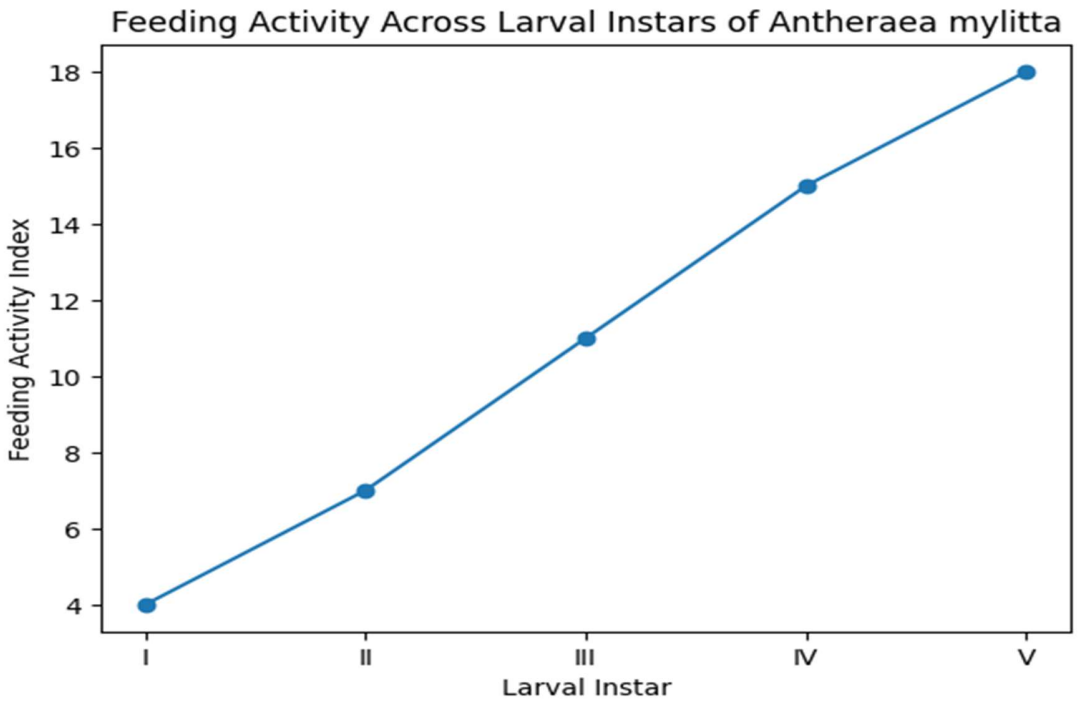


Table 2: Influence of Species Diversity on Behaviour

Habitat Type	Plant Diversity	Feeding Frequency
Low diversity forest	2–3 species	Moderate
Medium diversity forest	4–6 species	High
High diversity forest	7+ species	Very High

Figure 2 illustrates behavioural activity under different diversity levels.

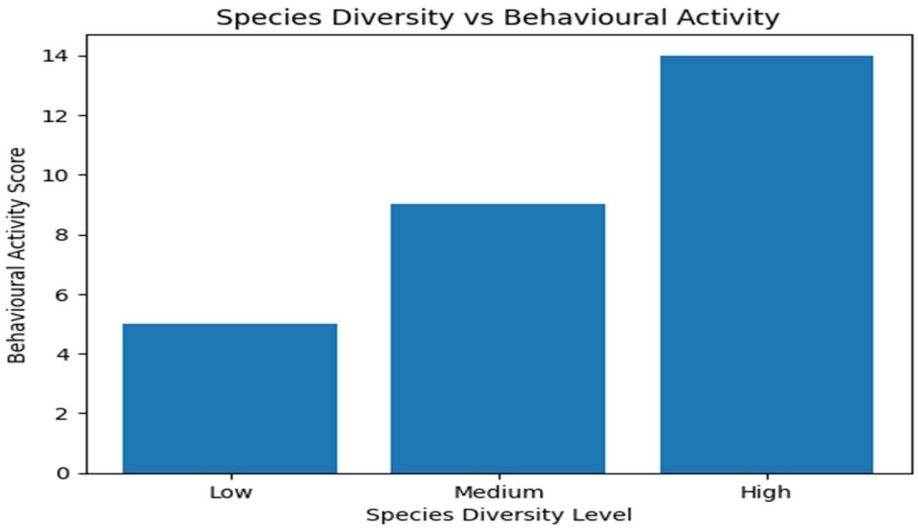
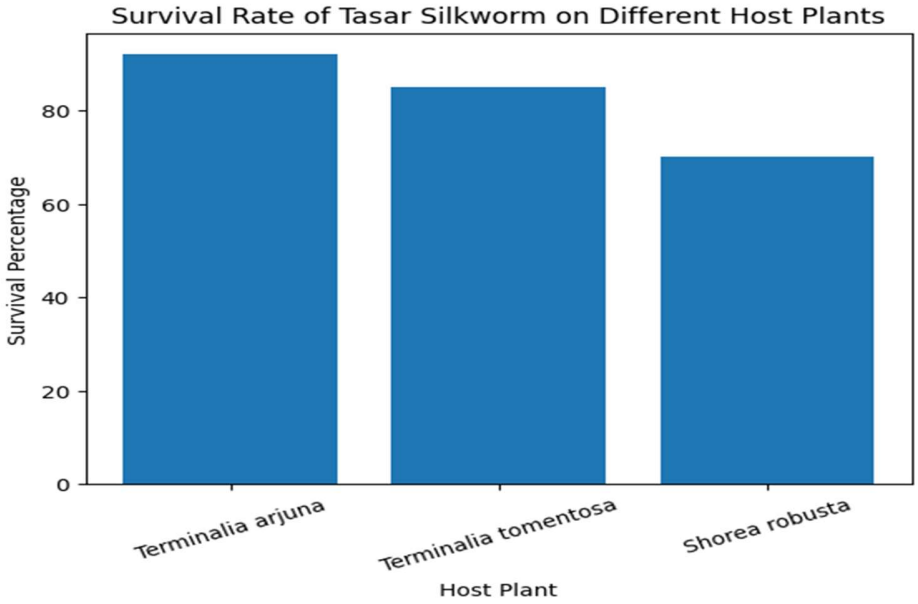


Table 3: Survival Rate on Different Host Plants

Host Plant	Survival (%)
Terminalia arjuna	92
Terminalia tomentosa	85
Shorea robusta	70

Figure 3 shows survival percentage of larvae on different host plants.



Results &Discussion

The observations indicated that species diversity had a noticeable influence on the behavioural traits of Antheraea mylitta larvae. The findings suggest that species diversity significantly influences the behavioural patterns of tropical tasar silkworm. Increased plant diversity provides multiple feeding options and microhabitats, which may stimulate larval activity and adaptability. Higher feeding frequency observed in diverse habitats may be associated with better nutritional availability and host plant suitability. Similar observations have been reported in other insect species where biodiversity enhances

ecological stability and behavioural flexibility. The variation in host plant preference also indicates that Antheraea mylitta larvae exhibit selective feeding behaviour depending on plant species and nutritional quality.

Conclusion

The present study demonstrates that species diversity plays an important role in shaping the behavioural traits of tropical tasar silkworm (Antheraea mylitta). Greater biodiversity in natural habitats enhances feeding activity, movement and adaptability of larvae. These findings highlight the ecological importance of maintaining plant diversity in tasar-growing regions for sustainable sericulture.