



Comparative Evaluation of Different Biostimulants in Tropical Tasar Silkworm Rearing

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The present study was conducted to evaluate the effect of different eco-friendly biostimulants on the growth performance, survival, and cocoon productivity of the tropical tasar silkworm. The experiment was carried out under field conditions using five treatments including control, seaweed extract, humic acid, extract, and coconut water. Biostimulant solutions were sprayed on host plant leaves before feeding to silkworm larvae. Observations were recorded on larval weight, larval duration, survival percentage, Effective Rate of Rearing (ERR%), cocoon weight, shell weight, shell ratio, and cocoon yield. The results revealed significant improvement in larval growth and cocoon characters in treated batches compared to control. Among all treatments, coconut water and seaweed extract showed superior performance in terms of larval survival, cocoon weight, and shell ratio. The study indicates that natural biostimulants can play an important role in sustainable tasar sericulture by improving economic traits and reducing dependency on synthetic chemicals.

Keywords: Tropical tasar, , Biostimulants, Seaweed extract, Humic acid, , Coconut water, Sustainable sericulture, Cocoon productivity, Larval growth, Organic tasar culture, Eco-friendly rearing, Shell ratio, ERR%

Introduction

Tropical tasar sericulture is an important forest-based agro-industry in India and provides livelihood support to tribal and rural populations. The tropical tasar silkworm, , feeds mainly on Arjun and Asan host plants and produces valuable wild silk with high commercial demand. However, cocoon productivity is often reduced due to poor nutrition, environmental stress, pathogen attack, and unfavorable climatic conditions. In recent years, eco-friendly biostimulants have gained importance in sustainable agriculture and sericulture. Biostimulants are natural substances that improve nutrient uptake, physiological activity, stress tolerance, and overall biological performance. Application of biostimulants on host plant foliage may improve leaf quality and feeding efficiency of silkworm larvae. Natural products such as seaweed extract, humic acid, aloe vera extract, and coconut water contain growth-promoting substances, vitamins, amino acids, minerals, antioxidants, and phytohormones that may positively influence silkworm growth and silk production. These materials are biodegradable, non-toxic, and environmentally safe. The present investigation was therefore undertaken to compare the effects of selected natural biostimulants on larval health, survival, and cocoon productivity of tropical tasar silkworm under field conditions.

Materials and Methods

Experimental Site

The experiment was conducted in a tropical tasar rearing field planted with healthy Arjun host plants. The field was maintained under uniform agronomic and environmental conditions throughout the experimental period.

Experimental Design

The study was designed using Randomized Block Design (RBD) with five treatments and three replications.

Treatment	Description	Concentration
T ₀	Control (water spray)	Normal water
T ₁	Seaweed extract	2–3 ml/L
T ₂	Humic acid	2 ml/L
T ₃	Aloe vera extract	5%
T ₄	Coconut water	10%

Each replication consisted of 50 larvae.

Preparation of Biostimulants

Seaweed Extract: Commercial liquid seaweed extract was diluted in clean water at recommended concentration.

Humic Acid: Humic acid solution was prepared by dissolving 2 ml humic acid in 1 litre of water.

Aloe Vera Extract: Fresh leaves were washed thoroughly and the gel portion was collected. The gel was blended with distilled water, filtered through muslin cloth, and diluted to 5% concentration.

Coconut Water: Fresh tender coconut water was collected hygienically and diluted to 10% concentration before application.

Method of Application

Biostimulant solutions were sprayed uniformly on host plant leaves during early morning hours once every 3–4 days. Leaves were allowed to dry naturally before feeding to larvae.

Rearing Procedure

Healthy Disease-Free Layings (DFLs) of tropical tasar silkworm were procured from a certified grainage center. Newly hatched larvae were brushed carefully onto host plants. Proper field sanitation and routine monitoring were maintained throughout the rearing period.

Observations Recorded

1. Larval Weight

Ten larvae from each replication were randomly selected and weighed using a digital balance during different larval stages. Average larval weight was expressed in grams.

2. Larval Duration

The duration from hatching to cocoon spinning was recorded in days for each treatment.

3. Survival Percentage

Survival percentage was calculated using the formula:

4. Effective Rate of Rearing (ERR%)

ERR% was calculated using the following formula:

5. Cocoon Weight

Mature cocoons were harvested and weighed individually using a digital balance.

6. Shell Weight

The pupae were removed carefully from the cocoons and the shell weight was recorded after drying.

7. Shell Ratio

Shell ratio was calculated by the following formula:

Results

Effect on Larval Growth

All biostimulant treatments showed improvement in larval growth compared to the control. The highest larval weight was observed in T₄ (Coconut water), followed by T₁ (Seaweed extract).

Effect on Survival and ERR%

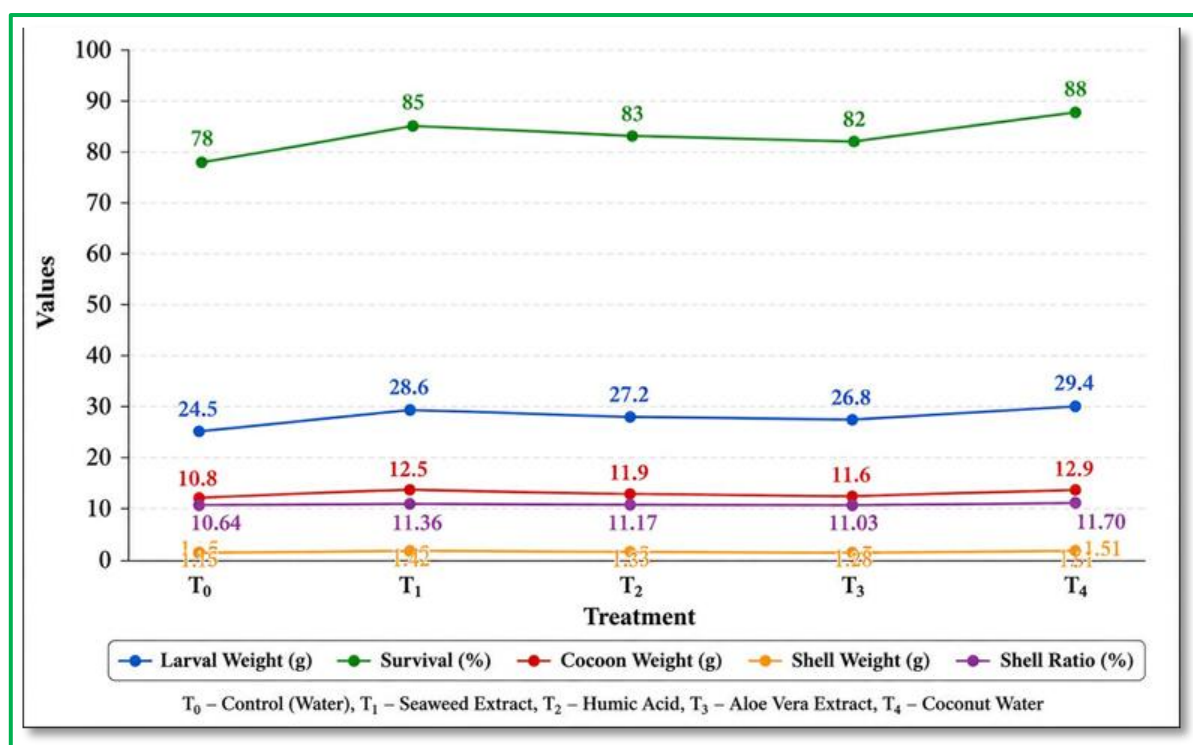
Survival percentage and ERR% were significantly higher in treated groups. Coconut water treatment recorded the highest survival percentage due to better feeding stimulation and nutrient availability.

Effect on Cocoon Characters

Cocoon weight, shell weight, and shell ratio were increased in all biostimulant treatments. T₄ and T₁ showed superior cocoon productivity compared to other treatments.

Table 1. Effect of Biostimulants on Economic Traits of Tropical Tasar Silkworm

Treatment	Larval Weight (g)	Survival (%)	Cocoon Weight (g)	Shell Weight (g)	Shell Ratio (%)
T ₀	24.5	78	10.8	1.15	10.64
T ₁	28.6	85	12.5	1.42	11.36
T ₂	27.2	83	11.9	1.33	11.17
T ₃	26.8	82	11.6	1.28	11.03
T ₄	29.4	88	12.9	1.51	11.70



Discussion

The study demonstrated positive effects of natural biostimulants on larval growth and cocoon productivity of tropical tasar silkworm. Biostimulant-treated larvae exhibited improved feeding behavior, healthy growth, and better survival compared to untreated control larvae. Seaweed extract treatment enhanced larval development possibly due to the presence of micronutrients, amino acids, and plant growth regulators. Humic acid improved nutrient utilization and feeding efficiency. Aloe vera extract may have contributed antioxidant and antimicrobial properties, thereby improving larval health and stress tolerance. Among all treatments, coconut water produced the best results in terms of larval weight, survival percentage, cocoon weight, and shell ratio. Coconut water contains natural cytokinins, sugars, vitamins, and amino acids that may stimulate physiological activities and improve silk gland development. The findings indicate that eco-friendly biostimulants can be effectively incorporated into tropical tasar rearing for sustainable cocoon production. Use of natural products may reduce chemical dependency and promote environmentally safe sericulture practices.

Conclusion

The present investigation confirmed that natural biostimulants positively influence growth performance and cocoon productivity of tropical tasar silkworm. Coconut water and seaweed extract were found to be the most effective treatments among the tested biostimulants. Application of eco-friendly biostimulants can therefore be recommended for sustainable and profitable tasar sericulture.