GROWTH PROMOTING EFFECT OF *Alternanthera ficoidea* PLANT EXTRACT ON LARVAL WEIGHT, GROWTH INDEX, AND COCOON CHARACTERISTICS OF SILKWORM, *Bombyx Mori* L.

S.B. Barge
Assistant Professor, Department of Zoology, Amolakchand Mahavidyalaya, Yavatmal
suryabhanbarge@gmail.com

A.B. Pardeshi
Professor, Department of Zoology, Deogiri College, Chhatrapati Sambhajinagar

Abstract
Growth promoting effect of Alternanthera ficoidea plant extract were tested against 3rd 4th and 5th instar larvae of silkworm for improving the performance of larval weight, Growth index and cocoon characteristics of silkworm, Bombyx mori L. The various concentrations of Alternanthera ficoidea plant extract the various concentrations of Alternanthera ficoidea plant extract (0.5, 1.0, 1.5, 2.0, and 2.5 %) were administered to 3rd, 4th and 5th instar silkworm with mulberry. The larval weight, and Growth Index characteristics were influenced by various concentration of plant extract. The intensity of influence was depending on the time and dose exposure. The plant extract at 2.0. Concentration resulted higher larval weight, growth index and cocoon characteristics the mean larval weights, relative growth rate of silkworm, Bombyx mori were increased. In the present study the plant extract of Alternanthera ficoidea have growth promoting effect in silkworm which helps to improve the performance of silk in Bombyx mori.
***Keywords**: Plant Extract, Larval Weight, Growth Index and cocoon characteristics on Silkworm.*

Introduction:

Sericulture is an agro based popular cottage industry and plays a vital role in the improvement of rural economy of India. The silkworm *Bombyx mori* L. is a phytophagous insect and a typical monophagous feeder on mulberry leaves. India is the second largest silk producer in the world after China. Germany is the largest consumer of Indian silk. The silk production analysis revealed that the sericulture has better prospects for growth in the developing countries. The sericulture industry in India helps the role of woman empowerment in rural area. It is well known for its low investment and quick and high returns which makes it an ideal industry fitting well in to the socio-economic frame of India. India is the second largest silk producer in the World after China. Germany is the largest consumer of Indian silk. Increase larval growth and cocoon quality and quantity would result better economics for this industry and meet the production needs.

Increase larval growth and cocoon quality and quantity would result better economics for this industry and meet the production needs. In recent years, many attempts have been made to improve the quality and quantity of silk through enhancing the leaves with nutrients, spraying with antibiotics, vitamins, hormones and hormone analogues, plant products or using extracts of plants.

Rajasekaragouda *et al.,* (1997) reported the influence of various phytochemicals from the medicinal plant extracts on life and performance of different insects. Various extracts of medicinal plants have been tested by supplementation in the silkworm *Bombyx mori* and were seen to influence the body weight, silk gland weight and the silk thread length in *Bombyx mori* (Murugan *et al.,* 1998). (Pardeshi and Bajad (2014a and b) studied the nutritional supplementation of *Amaranthus hybridus* and *Xanthium indicum* plant extracts on economic performance of mulberry silkworm, *Bombyx mori* L. Dietary suuplementation of the leaf, flower and pod extracts of *Moringa aleifera* (Rajeswari and Isaiarasu, 2004). The nutritional supplementation of *Sida acuta, Coix aquqtica and Ipomoea quamoclit, Cassi tora* plant extracts were studied on economic performance of mulberry silkworm, *Bombyx mori* L. (Barge and Pardeshi, 2024; 2019; 2022 and 2023).

(Karpe and Pardeshi 2025) showed that effect of plant extracts, of phytoecdysteroid containing plant extract of *Tridax procumbens* on larval growth performance of silkworm, *Bombyx mori* L.

The genus *Alternanthera,* a medicinally important herbs belongs to the family Amaranthaceae. *Alternanthera Ficoidea* It is medicinal plant mostly used in Stress is a physiological and psychological response that alters the homeostasis in the body and cellular stress can trigger several chronic illnesses and need to be addressed in the initial stages *Alternanthera ficoidea* occurs Polyphenolics such as tannins and flavonoids are proven powerful antioxidants to resolve cellular stress, sustain homeostasis in the body and prevent stress-associated disorders. (Mahalakshmi *et al*., 2021).

There has been no attempt so far to study the effect of *Alternanthera ficoidea* plant extract on the silkworm *B. mori*. The present study is an attempt to evaluate the influence of various concentration of plant extract on the growth and economic performance of silkworm *Bombyx mori.*

Materials and Methods

Animals:

The silkworm breed selected for the experiment was Indian bivoltine hybrid (CSR2 X CSR4) Disease free laying of the silkworm, *Bombyx mori* were obtained from district sericulture office, Aurangabad. After hatching larvae were isolated from stock culture and feeding them with appropriate quantity of fresh mulberry leaves. The III, IV and Vth instar larvae were utilized for the experiment. After third instar, the larvae were acclimatized to the laboratory condition and divided in to six experimental groups including control. During this period larvae were fed four times a day and maintain necessary disinfection condition.

Plant materials:

The leaves of the plant, *Alternanthera ficoidea* were collected, washed thoroughly with distilled water and shed dried. The dried leaves were powdered with the help of mechanical device. Further 50gm. powdered, thus obtained was subjected to phytoecdysteroids extraction through soxhlet apparatus with 500ml ethyl acetate solvent for 24 hrs. After 24 hrs, given extract was filtered and filtrate was evaporated completely. Evaporated extract material dissolved in distilled water and diluted to 0.5, 1.0, 1.5, 2.0 and 2.5% concentration for further experiment. Fresh mulberry leaves were sprayed with each concentration and then dried in air for 10 minutes. Treated leaves of various concentrations were fed to III, IV and V instar larvae, four feeding per day the silkworm larvae fed mulberry leaves sprayed with distilled water and served as control. The feeding were maintained up to the cocoon stage of the silkworm. Larval weight and growth index parameters were calculated for all doses. Results were presented as means ±S.D.

Larval Parameters (Morphometric study):

Ten silkworm larvae were randomly selected in each treated and control group and the larval weight was measured using electronic balance and it was expressed in gm.

Larval Growth Index:

Newly emerged thirty, III instar larvae of seven day old and V instar larvae of sixteen days old were weighed (gm.) and the following formula was used to calculate as Growth Index (GI).

$$G.I. = \frac{\textbf{Final weight of V instar larvae (gm)} - \textbf{Initial weight of larvae (gm)}}{\textbf{Initial weight of Larve (gm)}}$$

Results and Discussion:

The data on the effect of various concentration of *Alternanthera ficoidea* plant extract on morphometric study of larval growth weight, growth index and economic parameters cocoon characteristics of silkworm *Bombyx mori* are presented in Table-I

The dietary supplementation with various concentrations (0.5, 1.0, 1.5, 2.0, and 2.5 %) of plant extract to the silkworm larvae resulted in an increase in larval weight and larval growth index in third, fourth and fifth instar larvae. The third instar larvae in the control group grow with an initial weight of 0.319gm. It gradually increases with the increasing concentration of plant extract. The recorded larval weight and larval growth index was gradually increased up to the fifth instar larvae (2.367gm; GI: 10.271) at 2.0% concentration of plant extract while at 2.5% concentration larval weight and larval growth index was reduced (2.346gm GI: 10.171) due to the higher dose of plant extract containing bioactive compounds.

The larvae produced cocoon and weight of cocoon from control group (1.446gm) were lesser than experimental groups where larvae fed with various concentration of plant extract. When the concentration of plant extract was increased the cocoon weight also increased simultaneously. The maximum cocoon weight obtained in the present experiment was 1.857gm at the concentration of 2.0% of plant extract fed to silkworm larvae.

In the present study the treatment of plant *Alternanthera ficoidea* extract at the concentration of 0.5%, 1.0%, 1.5% and 2.0.% may have beneficial effect on the growth of the silkworm *Bombyx mori* and also increased the larval weight, larval growth index and cocoon weight than control whereas at 2.5 %) concentration, the morphometric performance of silkworm was comparatively reduced. Many researchers showed that the larval and cocoon characters improve by different concentration of plant extract and their natural formulation such as phytoecdysteroids, Ascorbic acid, folic acid, thiamin, vitamins, hormones, Alloe tonic etc., Konate and Souza (2010); Etaberi *et al.*, (2004); Balasundaram D *et al;(*2008); Khyade and Shendage (2012); Pandey and Upadhyay (2013); Venugopal *et al.*, (2012).

Table 1: Effect of ethyl acetate solvent plant extracts of *Alternanthera ficoidea* on the growth performance of Silkworm, *Bombyx Mori* L.

Group	Treatment Concentration	Larval wt. (gm)			Growth index	Cocoon weight (gm)
		III rd Instar	IV th Instar	V th Instar		
I	Control	0.319 ±0.004	0.816 ±0.005	2.219 ±0.07	9.566 ±1.07	1.446 ±0.08
II	0.5%	0.381 ±0.004	0.893 ±0.006	2.292 ±0.09	9.914 ±1.09	1.679 ±0.004
III	1.0%	0.392 ±0.004	0.954 ±0.005	2.316 ±0.08	10.028 ±1.10	1.783 ±0.004
IV	1.5%	0.446 ±0.005	0.988 ±0.006	2.338 ±0.09	10.133 ±1.11	1.834 ±0.005
V	2.0%	0.483 ±0.006	1.012 ±0.007	2.367 ±0.10	10.271 ±1.13	1.857 ±0.004
VI	2.5%	0.471 0.005	0.997 ±0.006	2.346 ±0.09	10.171 ±1.12	1.828 ±0.005

± indicates S.D. of three observations.

Fig: 1. Effect of ethyl acetate solvent plant extract of *Alternanthera ficoidea* on larval weight of Silkworm, *Bombyx mori.*

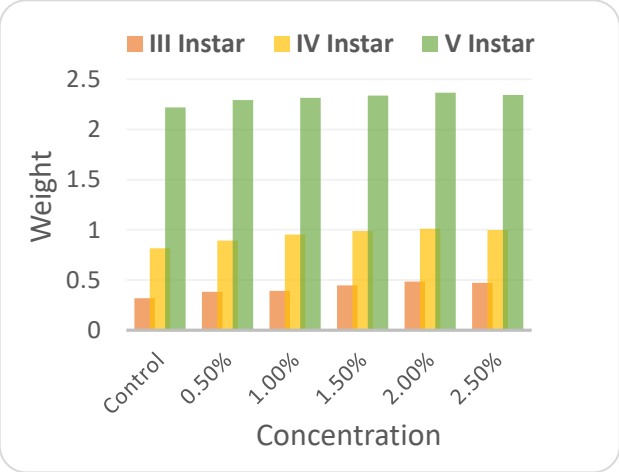
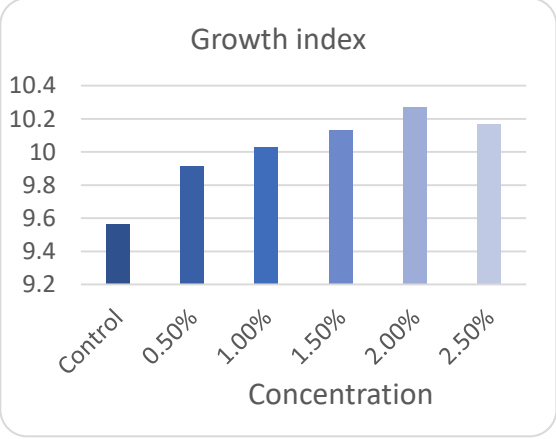


Fig: 2. Effect of ethyl acetate solvent plant extract of *Alternanthera ficoidea* on larval growth index of Silkworm, *Bombyx mori*.



Conclusion

The study results concluded that, the treatment of *B. mori* larvae with moderate concentration of plant extract caused growth promoting effect on larval performance, whereas the higher concentration of plant extract caused adverse effect.

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