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EFFECT OF ECOMORM ON ENERGY AND GROWTH CHARACTERISTICS OF BOMBYX MORI L

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ABSTRACT

Nutrition plays a pivotal role in sericulture by improving the commercial characters of silkworm. Silkworm being monophagous insects derives almost all the nutrients for its growth from the mulberry leaf itself (Nasreen *et al*., 1999). Probiotics has higher requirements for scientific substantiation of putative benefits conferred by the microorganisms. Disease free layings (DFLs) of PM x CSR2 multivoltine race was purchased from Government Sericulture Farm, All the rearing operations were carried out according to Krishnaswami *et al*. (1978). The hatched larvae were divided into untreated and experimental groups with three replications of 25 larvae each and fed with same quantity and quality of mulberry leaves. The different concentrations econorm was prepared and leaves were fed at one of the feeding schedules from the first day of third instar larvae onwards. The initial and final weight of the larvae were recorded to determine the larval growth, Food Consumption (FC), Assimilation, Tissue growth, Efficiency of Converting leaf Ingested (ECI) and Efficiency of Converting leaf Digested (ECD), Approximate Digestibility (AD), Relative Consumption Rate (RCR), and Relative Growth Rate (RGR) were calculated as suggested by Waldbauer (1968). The silkworm larvae treated with 3% econorm the ECD and ECI was 23.32±0.01, 17.77±0.02% during the third, 21.52±0.01, 18.39±0.01% during the fourth and 20.69±0.01, 17.74±0.01%, during the fifth instars respectively. Significantly higher length (46.51 percent) was

recorded in the fifth instar larvae fed with 5% econorm concentration. The present investigation clearly resulted that fortification of mulberry leaves with econorm increased the larval growth.

Keywords

Econorm, Approximate Digestibility, *Bombyx mori* l**,** Relative Growth, Assimilation

INTRODUCTION

Nutrition plays a pivotal role in sericulture by improving the commercial characters of silkworm. Silkworm being monophagous insects derives almost all the nutrients for its growth from the mulberry leaf itself (Nasreen *et al*., 1999). The fortification of mulberry leaves with supplementary nutrient and feeding silkworm is a useful modern technique increased the economic value of cocoon (Muniandy *et al*., 2001). Probiotics has higher requirements for scientific substantiation of putative benefits conferred by the microorganisms. Studies on the medical benefits of probiotics have yet to reveal a cause-effect relationship, and their medical effectiveness has yet to be conclusively proved (Rijkers *et al*., 2014). Prebiotics are substances that induce the growth or activity of microorganisms (e.g., bacteria and fungi) that contribute to the well-being of their host. The most common example is in the gastrointestinal-tract, where prebiotics can alter the composition of organisms in the gut microbiome. However, in principle it is a more general term that can refer to other areas of the body as well. For example, certain hand-moisturizers have been proposed to act like prebiotics to improve the activity or composition of skin-microbiota (Patrick, 2014).

MATERIALS AND METHODS

Disease free layings (DFLs) of PM x CSR2 multivoltine race was purchased from Government Sericulture Farm, Nannagaram, Tirunelveli District. The temperature in the rearing chamber was maintained at 28±2°C and the relative humidity (RH) was maintained at 73±5%. All the rearing operations were carried out according to Krishnaswami *et al*. (1978). The hatched larvae were divided into untreated and experimental groups with three replications of 25 larvae each and fed with same quantity and quality of mulberry leaves.

The different concentrations econorm was prepared and sprayed uniformly on mulberry leaves that were already surface washed with distilled water followed by air drying. The econorm treated mulberry leaves were fed at one of the feeding schedules from the first day of third instar larvae onwards.

The initial and final weight of the larvae were recorded to determine the larval growth, Food Consumption (FC), Assimilation, Tissue growth, Efficiency of Converting leaf Ingested (ECI) and Efficiency of Converting leaf Digested (ECD), Approximate Digestibility (AD), Relative Consumption Rate (RCR), and Relative Growth Rate (RGR) were calculated as suggested by Waldbauer (1968). The initial and final weight of third, fourth and fifth instar larvae were recorded by an electronic balance and expressed in gram and the length of third, fourth and fifth instar larvae were recorded using scale and expressed in centimeter.

RESULTS

The food consumption rate of 1% econorm treated *B.mori* larvae was 0.476±0.0004, 0.548±0.001 and 1.782±0.0008 g/larva/day, in the 3% econorm treated larvae the food consumption rate was 0.489±0.0008, 0.576±0.001 and 1.847±0.0008 g/larva/day and in the 5% econorm treated larvae the consumption rate was 0.492±0.001, 0.579±0.0008 and 1.871±0.001 g/larva/day during the third, fourth and fifth instar respectively. Assimilation and growth rate was calculated to be 0.382±0.0004, 0.093±0.002g (third instar), 0.497±0.0008, 0.109±0.001 g (fourth instar) and 1.611±0.001, 0.352±0.0008 g in the fifth instar silkworm larvae feeding with 5% econorm treated leaves (Figure 1.1). ECD and ECI recorded significantly higher in 5% econorm treated larvae as 24.33±0.01, 18.89±0.01 in the third instar, 21.87±0.01, 18.84±0.01% in the fourth instar and 21.80 ±0.008, 18.77±0.01% in the fifth instar and the least was recorded at 1% as 22.52±0.01, 17.22±0.01% (third), 22.42±0.008, 19.16±0.01% (fourth), 20.41±0.009, 18.36±0.01% in the fifth instar larvae. The silkworm larvae treated with 3% econorm the ECD and ECI was 23.32±0.01, 17.77±0.02% during the third, 21.52±0.01, 18.39±0.01% during the fourth and 20.69±0.01, 17.74±0.01%, during the fifth instars respectively (Figure 1.2).

The digestibility data at 3% and 5% econorm concentration of third, fourth and fifth instar larvae was 75.85±0.009, 86.15±0.02, 86.20±0.01% and 77.05±0.02, 86.41±0.01, 86.52±0.01% respectively.Relative consumption rate of 5% econorm treated larvae was 66.13±0.01 (third instar), 71.72±0.01 (fourth instar) and 72.65±0.02% (fifth instar) (Figure 2.5). The relative growth rate of the 5% econorm treated larvae was 14.47± 0.01 (third instar), 19.39±0.01 (fourth instar) and 65.32±0.008% (fifth instar) Significantly higher length (46.51 percent) was recorded in the fifth instar larvae fed with 5% econorm concentration.

At 5% econorm concentration 0.494±0.004, 1.431±0.001 and 4.108±0.004gm larval weight was observed during the third, fourth and fifth instars .The larvae fed with 5% econorm, cocoon length and breadth was

4.06±0.04 and 0.33±0.008cm, where as the cocoon weight, shell weight, sericin content and fibroin content was 1.51±0.01, 0.35±0.008, 0.16±0.004 and 0.19±0.008g respectively and the shell ratio was 23.17±0.01%. There was a stable increase in the weight of the silk filament in various concentration of econorm.

The larvae fed with 1% econorm concentration the larval weight was 0.421±0.001, 1.387±0.001 and 3.833±0.002gm, at 3% econorm concentration the larval weight was 0.463±0.004, 1.395±0.002 and 4.016±0.01gm, at 5% econorm concentration 0.494±0.004, 1.431±0.001 and 4.108±0.004gm larval weight was observed during the third, fourth and fifth instars (Table 1).

Figure 1.1 Effect of different concentrations of econorm on energy parameters such as food consumption, assimilation and tissue growth of silkworm *B. mori* larvae

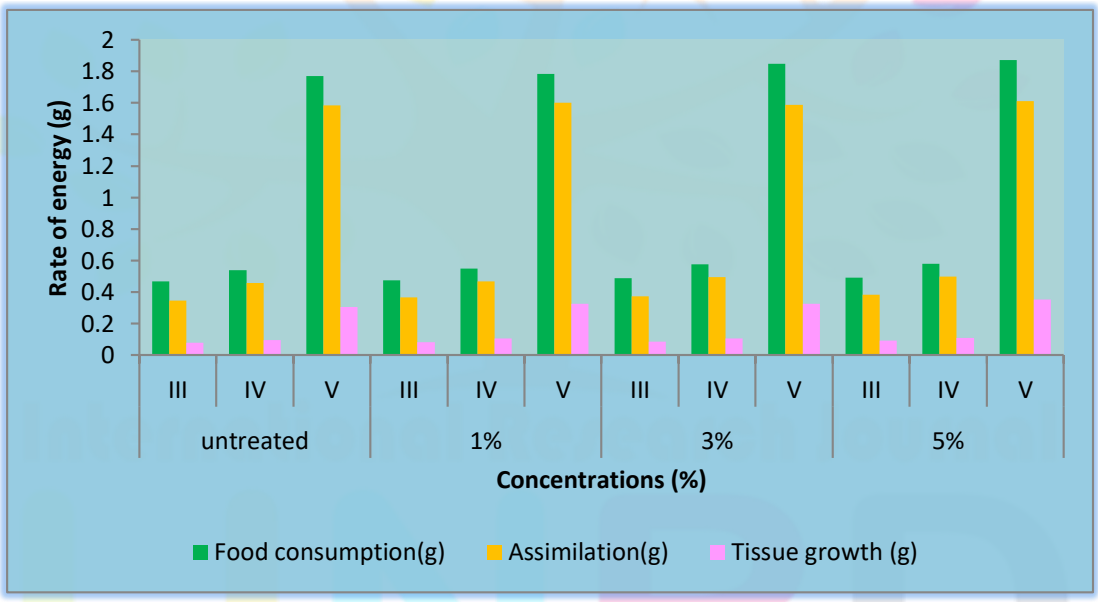

Figure 1.2 Effect of different concentrations of econorm on energy parameters such as ECD, ECI, AD, RCR and RGR of silkworm *B. mori* larvae

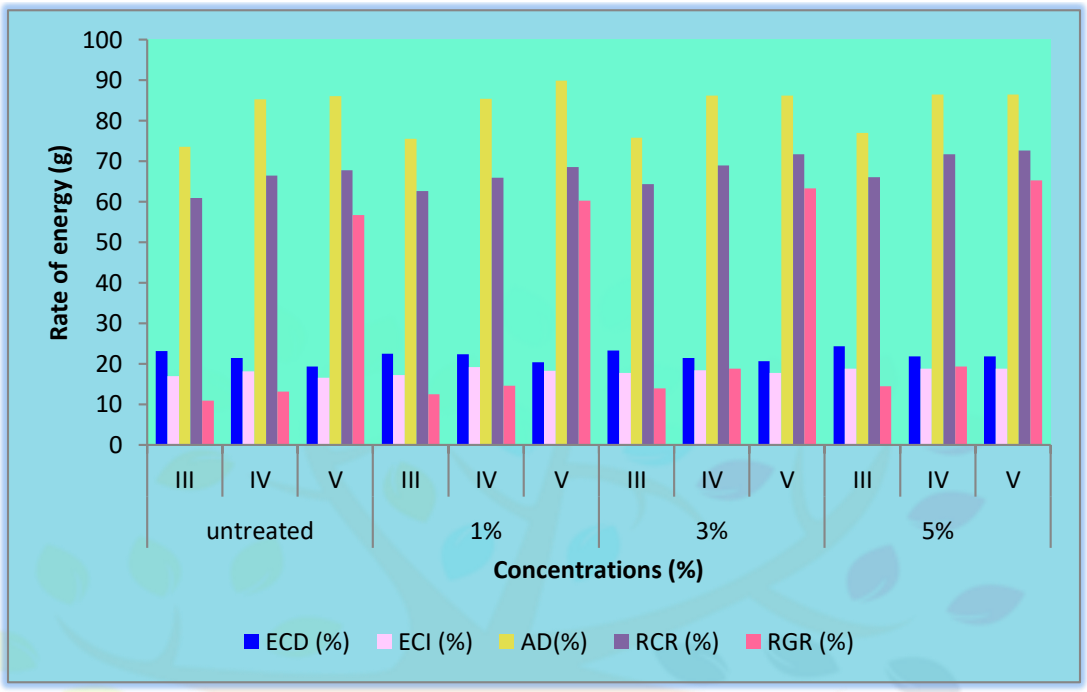

Table 1 Effect of econorm on the growth parameters of silkworm *B.mori* larvae

Treatments	Larval length (cm)			Larval weight (gm)		
	III	IV	V	III	IV	V
Untreated	2.9±0.1	3.6±0.4	4.3±0.2	0.382±0.003	1.343±0.001	3.604±0.001
1%	3.1±0.0 (6.89)NS	4.2±0.1 (16.6)	5.2±0.04 (20.93)	0.421±0.001 (10.20)	1.387±0.001 (3.27)NS	3.833±0.002 (6.35)NS
3%	3.8±0.1 (31.03)	4.8±0.1 (25)	5.7±0.1 (32.55)	0.463±0.004 (21.20)	1.395±0.002 (3.87)NS	4.016±0.001 (11.43)
5%	4.2±0.2 (44.82)	5.2±0.1 (44.4)	6.3±0.35 (46.51)	0.494±0.001 (29.31)	1.431±0.001 (6.55)NS	4.108±0.004 (13.98)

Each value represents the mean ± SD of 3 replications
*Significant at p≤ 0.05 (t-test); NS-Not significant

DISCUSSION

Ahamed *et al*. (2001) reported that the choloramphenicol treated batches the food assimilated, assimilation rate and assimilation efficiency were higher which might be due to the influence of antibiotics on the physiology of silkworm. Vyjayanthi and Subramanyam (2002) stated the feeding behavior of silk worm *B. mori* which

depends on niche, amount of food offered, quality of food, age and health of larvae. In the present study, food consumption and utilization were lowest in young instars and measured gradually as the growth progressed. In the present study food consumption significantly increased in larvae belonging to the third, fourth and fifth instars treated with different concentrations of pre and probiotics

Maximum assimilation was observed when ciprofloxacin was administrated to the *B. mori* larvae (Sheeba *et al*., 2008). Ghasemi *et al*. (2007) demonstrated that commercial probiotics are commonly capable of producing a wide range of exoenzymes such as protease, amylase and lipase. They can improve food digestion by breaking large molecules of protein, carbohydrate and lipid into smaller units and enhance its nutritional value (Verschuere *et al*., 2000). The present investigation clearly resulted that fortification of mulberry leaves with extra nutrients increased the larval growth.

BIBLIOGRAPHY

Verschuere, L., Rombaut, G., Sorgeloos, P. and Verstraete, W. 2000. Probiotic bacteria as biological control agents in aquaculture. *Microbiology and Molecular Biology Reviews*, **64:** 655-671.

Sheeba, D. V. R. 2005. Bacterial diseases in the silkworm *Bombyx mori* L. in Tirunelveli district and management techniques to improve economic traits. *Ph.D Thesis*, Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu.

Ahamed, A. C. A., Chandrakala, M. V., Maribashetty, V. G. and Raghurainan, R. 2001. Impact of chloramphenicol administration on nutritional efficiency in a multivoltine race of silkworm, *Bombyx mori*. *Entomon*, **26**(1): 1-9.

Waldbauer, G.P. 1968. The consumption and utilization of food by insect. *Advances in Insect Physiology*, **5: 229-288.**

Krishnaswami, S. 1978. New Technology of Silkworm Rearing. Bulletin No.2, Central Sericultural Research and Training Institute, *Mysore, India*, pp.1-24.

Rijkers, G.T., De Vos W. M., Brummer, R. J., Morelli, L., Corthier, G. and Marteau, P. 2011. "Health benefits and health claims of probiotics: Bridging science and marketing". *British Journal of Nutrition*, **106**(9): 1291–1296.

Partrick, D. S. 2014. Microbiology: An integrated View of the Skin Microbiome. *Nature*, **514**(7520): 44-45.

Muniandy, S., Sheela, M. and Nirmala, S. 2001. Effect of vitamins and minerals (Filibon) on food intake, growth and conversion efficiency in *Bombyx mori L*. *Environmental Ecology*, **13**: 433-43.

Nasereen, A., Cheema, G. M. and Ashfaq, M. 1999. Rearing of silkworm *Bombyx mori L.* on alternative food parts. *Pakistan Journal of Biological Sciences,* **2**: 843-845.

Vyjayanthi, N. and Subramanyam, M. V. V. 2002. Effect of fenvalerate- 20EC on sericigenous insects: I. food utilization in the late-age larva of the silkworm, *Bombyx mori L. Ecotoxicology and Environmental Safety*, **53**: 206-211.