

STUDY OF SUPPLEMENTARY FOOD WITH $MgCl_2$ ON REARING PERFORMANCE OF ERI SILKWORM (*PHILOSAMIA RICINI*)

DR. SHUBHANGI VAIDYA, DR. ULKA YADAV

Abstract: The Eri silkworm (*Philosamia ricini*) is multivoltine, holometabolus, poly phagous, non-mulberry, completely domesticated silkworm. Nutrition plays an important role in improving the growth and development of the silkworm like other organisms and also plays an important role for increasing the quality of seed cocoons and quality of silk also. In the present study supplementary food as micronutrient was subjected in the form of $MgCl_2$ to Eri silkworm (*Philosamia ricini*) on castor leaves. We observed the effect of micronutrients $MgCl_2$ on rearing performances (Larval parameters, Cocoon parameters and Grainage parameters) of Eri silkworm (*Philosamia ricini*). Our findings clearly indicated that the treatment of $MgCl_2$ with different doses by spraying method gave better results than dusting method on all larval parameter (except larval weight), cocoon parameters and grainage parameters.

Keywords: Eri silkworm (*Philosamia ricini*), Micronutrient, Larval Cocoon Grainage parameter.

Introduction: The present global scenario indicates the enormous opportunities for the Indian silk Industry, because India is the second largest producer of silk in the world. According to FAO estimates, the world raw silk production for the year 2010 was 1,64,971 Tonnes in Asia and especially in Eastern Asia. In India, annual silk production is reported around 19,000 Tonnes in 2010 (Styliani Kalantzi *et al.*, 2013). India has the unique distinction of being only country producing all the five commercially traded varieties of natural silks namely Mulberry, Eri, Muga, Tropical Tasar and Temperate Tasar. India has a distinct advantage of practicing sericulture all throughout the year, yielding a stream of about 4-6 crops as a result of its tropical climate India is the largest producer of Eri silk in the world as 96% of Eri silk is produced in India of the total Eri silk produced in the world (Rajesh Kumar and S.K.Gangwar 2010). Ericulture is believed to have originated in the Northeastern part of India especially Assam. Apart from the North-East region, Ericulture is also practiced in states of Andhra Pradesh, West Bengal, Uttar Pradesh, Uttaranchal, Bihar and Orissa (Krishna Rao, 2003, Ray *et al.*, 2006). Recently Ericulture is being introduced in Madhya Pradesh, Delhi, Punjab, Karnataka and Maharashtra (Sahu *et al.*, 2006. Kshama Giridhar *et al.*, 2007).

Eri silk is produced by Eri silkworm *Philosamia ricini* (Lepidoptera: Saturniidae). Eri silkworm is multivoltine, holometabolus, polyphagous, non-mulberry, completely domesticated silkworm. Nutrition plays an important role in improving the growth and development of silkworm like other organisms and also plays an important role for increasing the quality of seed cocoons and quality of silk also. It is stated that silk production is dependent on the larval nutrition and nutritive value of castor leaves. These plays a very effective role in producing

good quality cocoons. We observed the effect of micronutrients $MgCl_2$ on rearing performance of Eri silkworm (*Philosamia ricini*). The rearing performance of each experiment was recorded by **Larval parameters** (larval length, larval weight, larval duration, ERR and pupation), **Cocoon parameters** (cocoon weight, shell weight, pupae weight and shell %) and **Grainage parameters** (Fecundity and hatching). The present study provides comprehensive information on Eri silkworm culture to improve productivity and profitability of rearers of Ujjain District. This study may be further useful to those who are eager to contribute to the sustainable development of rural India through **Ericulture**.

Material and Methods: The present study was conducted in the Zoology Department of Government P.G. Madhav Vigyan Mahavidyalaya Ujjain, (M.P). Disease free laying (DFLs) of Eri silkworm (*Philosamia ricini*) were collected from Govt. Sericulture Department, Indore M.P. Rearing was done in the prevailing climatic condition and standard tray rearing method was adopted as recommended by Choudhary *et al.*, (1982)

In the present study supplementary food as micronutrient was subjected in the form of $MgCl_2$ to Eri silkworm (*Philosamia ricini*) by two different methods - spraying and dusting on castor leaves. 7 batches were taken to study the effects of $MgCl_2$ micronutrient. 1st batch was considered as control without treatment. 2nd and 3rd batches were treated with $MgCl_2$ micronutrients ones a day for spraying and dusting methods 4rd and 5rd batches were treated with $MgCl_2$ micronutrients twice a day for spraying and dusting methods 6th and 7rd batches were treated with $MgCl_2$ micronutrients thrice a day for spraying and dusting methods.

Observations:

The different observations recorded during the experiment are as under:-

Parameters	Control	Method of Treatments					
		spraying			dusting		
		I dose (Ones a day)	II dose (twice a day)	III dose (Thrice a day)	I dose (Ones a day)	II dose (twice a day)	III dose (Thrice a day)
Larval Length	6.5cm	6.3cm	6.4cm	6.6cm	6.2cm	6.3cm	6.6cm
Larval Weight	7.5gm	7.4gm	7.2gm	7.1gm	7.3gm	7.2gm	7.1gm
Larval duration	19days	18.3days	18.2days	18.1days	18.4days	18.3days	18.2days
ERR%	90%	89%	89.8%	91%	88%	89%	89%
Pupation	91%	91.2%	91.4%	92.5%	90%	91.5%	91.8%

Cocoon Parameters	Control	Method of Treatments					
		spraying			dusting		
		I dose (Ones a day)	II dose (twice a day)	III dose (Thrice a day)	I dose (Ones a day)	II dose (twice a day)	III dose (Thrice a day)
Cocoon weight	3.56gm	3.52gm	3.56gm	3.58gm	3.53gm	3.56gm	3.56gm
Pupae Weight	3.01gm	2.99gm	3.02gm	3.04gm	3.01gm	3.02gm	3.04gm
Shell weight	.52gm	.53gm	.53gm	.54gm	.53gm	.54gm	.53gm
Shell ratio%	14.56	15.1	15.2	15.29	14.90	15.1	15.10gm

Grainage Parameters	Control	Method of Treatments					
		spraying			dusting		
		I dose (Once a day)	II dose (twice a day)	III dose (Thrice a day)	I dose (Once a day)	II dose (twice a day)	III dose (Thrice a day)
Fecundity	478	475	477	480	472	475	479
Hatching	82%	83%	84%	84%	80%	82.4%	84%

Results and Discussion: The present study indicated that the effect of MgCl₂ by both methods on larval parameter of Eri silkworm varied with different doses. Larval length and pupation were increased, larval weight was decreased, Larval duration improved and ERR% was more or less similar with control batch. Results of larval parameters were found slightly more in spraying method than dusting

method. In present study, cocoon parameter was affected by MgCl₂ doses. The cocoon weight, pupae weight, shell weight and shell ratio increased in both spraying and dusting methods by treatment of different doses of MgCl₂. Results of cocoon parameters were found more in spraying method than dusting method. In present study, grainage parameters fecundity and hatching both increased

during the treatment of MgCl₂ in both spraying and dusting method. Present results indicated that the treatment of MgCl₂ with different doses by spraying method gave better results than dusting method on all larval parameter (except larval weight), cocoon parameters and grain age parameters.

There are several reports containing the positive effect of nutrition supplementation on the larval, cocoons and grainage parameters of silkworm. Seki and Oshikane (1959) observed that better growth and development of silkworm larvae as well as good quality cocoons can be obtained when silk worms are fed on nutritionally enriched leaves. Stockner (1971) reported that food ingestion and food assimilation increases the larval body substance in *Philosamia ricini*. Pant and Katikar (1983) studied the effect of malathion and acetylcholine on the developing larvae of *Philosamia ricini* (Lepidoptera: saturniidae). Bajpeyi *et al.*, (1991) Qader *et al.*, (1992) reported that the nutritional supplements when added to normal food, they tend to increase the nutritional value of the food and improve the vital parameters of the

silkworm. Maribashetty *et al.*, (1999) Narayanaswamy AND Ananthanarayana (2006) reported that the food consumption has a direct influence on larval and cocoon parameters of *Bombyx mori*. Venkataramana (2003) Venkatesh kumar *et al.*, (2009) noted that mulberry leaf supplemented with spirulina as a food to *Bombyx mori L.* orally found to be effective in enhancing the larval and cocoon characters. Bhattacharya *et al.*, (2006) reported that supplementation of Potassium chloride and Magnesium chloride increased cocoon and shell weight fecundity in *Bombyx mori*. Chakrabarty and Kaliwal (2011) reported that Potassium carbonate and mixture of Potassium carbonate and Magnesium carbonate significantly increased the larval parameters and Grainage Parameters of *Bombyx mori* but there was no significant change in the larval duration. Mitalee Baruah (2012) reported that increase in the food value of Eri silkworm (*Philosamia ricini*) increases the production of Eri silk in present environmental condition.

References:

- Bajpeyi, C.M.; Singh, R.N. and Thangavelu, K. 1991. Supplementary nutrients to increase silk production. *Indian Silk*.30 (7):41-42.
- Bhattacharya, A. and Kaliwal, B.B. 2006. Fortification of potassium and magnesium choired and synergetic effect on economic traits of the silkworm, *B.mori L* .Caps. J. Environ. Sci. (communicated).
- Chakrabarti, S. and Kaliwal, B.B. 2011. Supplementation with potassium carbonate, Magnesium carbonate and their synergetic effects on the economic traits of the silkworm, *Bombyx mori L.* *world Journal of Science and Technology* 1(5):10-23.
- Krishna Rao, J.V. 2003. Large scale development of Ericulture in India. *Indian Silk*, 42 (1): 27-29.
- Kshama Giridhar.; Mathanta, J. C. and Deole, A. L., 2007. Raw silk production 2006-07. *Indian Silk*. 46 (6): 43-44.
- Maribashetty, V.K.; Chanrdakala, M.V.; Aftab Ahamed, C.A. and Rao, K. 1999. Food and water utilization patterns in new bivoltine races of silkworm *Bombyx mori L.* *Ind. Acad. Seri.* 3(1): 83-90.
- Mitalee Baruah 2012. Studies on larval weight and shell ratio of Eri silkworm (*Philosamia ricini*) on castor, kesseru and treated kesseru by foliar spray. *IICAES Special Issue on Basic. Applied and Social Sciences*, 2.
- Narayanaswamy, M. and Ananthanarayana, S.R. 2006. Biological role of feed supplement serifeed on nutritional parameters, cocoon characters and cocoon yield in silkworm. *Bombyx mori L.* *In.J.Seric.*45 (2):110-115.
- Quader, M.A.; Qaiyyum, M.A.; Sarkar, A.A. Rab, M.A. and Ahmad, S.U. 1992. Varietal response to NPK fertilizers in combination with foliar spray of urea on leaf yield and leaf quality of mulberry. *Bulletin of Sericulture Research*.3:64-66.
- Radha pant and Katiyar S.K. 1983. Effect of malathion and acetylcholine on the developing larvae of *Philosamia ricini* (Lepidoptera: saturniidae) *J. Biosci.*, Vol.5, Number 1, March 1983, pp.89-95.
- Rahmathulla, V.K.; Priyabrata Das.; Ramesh, M.; and Rajan, R.K. 2007. Growth rate pattern and economic traits of silkworm, *Bombyx mori L.* under the influence of folic acid administration. *Journal of Applied Sciences and environmental Management* 11(4): 81-84.
- Rajesh Kumar and S.K.Gangwar. 2010. Impact of varietal feeding on *Samia ricini* DONOVAN in spring autumn season of Uttar Pradesh ARPJN *Journal of Agriculture and Biological Science* 5(3).
- Ray, B.C.; Chakravarty, R.; Kar, N.B.; Das, N.K.; Sengupta, A.K. and Sarkar, A. (2006) Ericulture in West Bengal and its introduction in the plains. *Indian silk*. (10):19-23.
- Rouhollah Radjabi 2010. Effect of mulberry leaves enrichment with amino acid supplementary nutrients on silkworm, *Bombyx mori L.* at North of Iran. *Academic Journal of Entomology*. 3(1):45-

- 51.
15. Sahu, M.; Bhuyan, N. and Das, P.K. 2006. Eri silkworm, *Samia ricini* (Lepidoptera: Saturniidae) Donovan, Seed production during summer in Assam. In: *Proceeding of Regional seminar on "Prospects & problems of sericulture as an economic enterprise in North West India, Dehradun, India.* 490-493.
16. Seki, K. and Oshikane, K. 1959. Res. Report. Fac. Textile and Sericulture, Shinshu University.
17. Stockner J.H. 1971. J. Fish. Res. Bd. An. 28:73-94. Cited in Dey S. 1983 Food utilization by the last instar larvae of the silk-moth, *Antheraea proylei* in indoor condition. *The Indian Zoologist.* 7(122):85-87.
18. Styliani Kalantzi, Diomi Mamma and Dimitris Kakos. 2013 INTECH.
19. Venkataramana, P.; Rao, S.; Reddy, P. and Suryanarayana, N. 2003. Effect of spirulina on the larval and cocoon characters of silkworm, *Bombyx mori* L. *Proc. Nat. Acad Sci. India,* 73: B (1):89-94.
20. Venkatesh Kumar R.; Dhiraj Kumar.; Ashutosh Kumar and Dhami, S. 2009. Effect of blue green algae (*Spirulina*) on cocoon quantities parameters of silkworm (*Bombyx mori* L.) *ARPN journal of Agriculture and Biological Science.* 4 (3).

Dr. Shubhangi Vaidya/Asstt. Professor Govt. P.G.M.V.M.Ujjain M.P / svaidya1961@hotmail.com
Dr. Ulka Yadav/ Professor and Head/Department of Zoology/ Microbiology and Bioinformatics/
Govt. P.G.M.V.M.Ujjain M.P