N O T E

Response of Muga Silkworm, *Antheraea assama* Westwood (Lepidoptera: Saturniidae), to Ascorbic Acid Placed on Host Plant Leaves[1]

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Host plant foliage plays an important role in silkworm nutrition and, in turn, cocoon and silk production and quality (Nagaraju 2002, Current Sci. 83(4): 231; Seidavi et al. 2005, Asia Pac. J. Clin. Nutr. 14(Suppl):S122). Furthermore, nutritional management directly influences the quality and quantity of silk production in *Bombyx mori* L. (Murugan et al. 1998, J. Sci. Ind. Res. 57:740 - 745).

Mulberry leaves have been supplemented with various nutrients for silkworm feeding to promote silk quality and quantity and is a relatively recent technique in sericultural research (Murugan et al. 1998). Vitamins of the B-complex group and certain essential sugars, proteins, amino acids, minerals, etc., are responsible for the proper growth and development of the silkworm (Faruki 1998, Univ. J. Zool. Rajshahi Univ. 17:39 - 44; Faruke et al. 1992, Bangladesh J. Zool. 20:351 - 353; Saha and Khan 1999, Bangladesh J. Life Sci. 11:103 - 109). With this knowledge of nutrition being a regulating factor in growth and health of silkworms, our study reported herein investigated the growth of larvae and characteristics of the cocoons of the muga silkworm, *Antheraea assawa* Westwood, fed on som plant, *Persea bombycina* King, leaves enhanced with ascorbic acid solutions.

Disease-free silkworm larvae used in the study were produced at the Muga Research Laboratory (West Bengal, India). Silkworms were reared under ambient outside conditions on som plants during October – November of 2007 - 2009. Five concentrations of ascorbic acid (3.0%, 3.5%, 4.0%, 4.5%, and 5.0% [w/v]) were spread over the top and bottom surfaces of plant leaves removed from the host plants. Recently-emerged fourth-instar silkworms were then placed on the treated leaves and allowed to feed until cocoon spinning began. At that time, individual larvae were transferred to mountages for cocoon production. Larvae in a control were simultaneously fed untreated som leaves.

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Table 1. Influence of different doses of ascorbic acid on economic parameters of muga silkworm.

Ascorbic Acid Concn (%)	Larval weight (g)	Cocoon weight (g)	Shell weight (g)	Silk Ratio (%)	ERR%	Cocoon yield (kg)	Fecundity	Hatchability
3.0	6.35	5.22	0.37	7.18	30.34	15.98	207.75	166.58
3.5	6.48	5.49	0.38	6.87	31.92	17.68	213.09	173.75
4.0	6.94	5.72	0.40	6.99	36.29	20.93	217.42	176.42
4.5	6.95	5.59	0.39	7.01	36.79	20.77	214.59	168.92
5.0	6.80	5.46	0.38	6.96	38.05	20.90	208.42	161.59
Control (0)	6.14	5.25	0.35	6.77	23.92	12.57	212.25	161.75
CD ($P = 0.05$)	0.23	0.18	0.008	0.22	2.16	1.44	4.15	4.96

Effective rate rearing (ERR%), mature larval weight, cocoon weight, cocoon yield, shell weight, shell ratio %, fecundity, and hatchability were recorded. Treatments were arranged in a randomized complete block design with 3 replications (100 insects per rep) of each treatment. The various parameters measured are presented in Table 1.

Response of larval weight to ascorbic acid concentration ranged from 6.35 g for 3.0% ascorbic acid to 6.94 g and 6.95 g for respective concentrations of 4.0% and 4.5% ascorbic acid. Larval weight in the control group was 6.14 g. Similar trends were noted with cocoon weight with weights of 5.72 g with 4.0% ascorbic acid and 5.22 g with 3.0%. Cocoon weight in the control was 5.25 g. The shell weight values ranged from 0.37 g (3.0%) to 0.40 g (4.0%) with a value of 0.35 for the control. The highest silk ratio percentage occurred with 3.0% ascorbic acid (7.18%), followed by 4.5% ascorbic acid (7.01%). The lowest among the ascorbic acid treatments was with 3.5% ascorbic acid (6.87%) and the control at 6.77%. ERR% was highest with 5% ascorbic acid (38.05%) followed by 4.5% ascorbic acid (36.79%). The lowest ERR% was observed with 3.0% ascorbic acid (30.34%) and the control (23.92%). The highest cocoon yields were observed in treatments with 4% ascorbic acid (20.93 kg), 5% ascorbic acid (20.90 kg) and 4.5% ascorbic acid (20.77 kg). Concentrations of 3% and 3.5% were significantly lower than the other ascorbic acid concentration, and the control cocoon yield (12.57 kg) was significantly lower than all 5 ascorbic acid treatments. Fecundity and hatchability were not as variable across the treatments as the other parameters measured (Table 1).

Our research indicates that ascorbic acid supplements to the mug silkworm diet can significantly improve the rate of rearing and increase silk content and cocoon yield; however, we did not observe significant differences among the 5 ascorbic concentrations tested for these observed parameters. In general, we observed enhanced larval growth, cocoon weight and silk production in ascorbic acid concentrations ranging from 3.5 - 4.5%. Optimal cocoon yield, fecundity and hatchability occurred with a supplement of 4% ascorbic acid. Similar results are reported with varying ascorbic acid concentrations and different silkworm species (Babu et al. 1992, Indian J. Seric. 31:111 - 114; El-karaksy and Idriss 1990, J. Appl. Entomol. 109:81 - 86; Chauhan and Singh 1992, Sericologia 32:567 - 574). Supplementing the diet of late-age mug silkworm larvae with ascorbic acid may prove favorable in improving the commercial quality of silk fiber and should be further investigated for use in sericulture for yield enhancement.