International Journal of Advances in Engineering and Management (IJAEM)
Volume 4, Issue 1 Jan 2022, pp: 707-710 www.ijaem.net ISSN: 2395-5252

Effect of Artificial Diet with Vitamin C on the Rearing Fibroin and Sericin Content of Silkworm Bombyx Mori. L

1. Dr. K.Sathesh, 2. Dr. W. Kerenhap Evangelin

1. Department of Zoology, Thiyagi Dharmakan Amirtham Arts and Science College, Kannirajapuram 623 135, Ramanathpuram, Tamilnadu, India.

2. Department of Zoology, St.John's College, Palayamkottai 627002, Tamilnadu, India.

Submitted: 15-01-2022 Revised: 23-01-2022 Accepted: 25-01-2022

ABSTRACT

The silkworm Bombyx.mori L was reared on artificial diet with Vitamin C and diet without Vitamin C. The experimental setup of 7 treatments namely T_0, T_1, T_2, T_3, T_4, T_5 and T_6 were done. In cocoon the fibroin and sericin content were analyzed. The better result was observed on diet with Vitamin C in T_1 and T_2 treatment only. T_3, T_4, T_5 and T_6 contain least content of fibroin compared to the diet without Vitamin. The highest sericin content was observed in T_3, T_4, T_5 and T_6 larvae, treated diet with Vitamin C compared to diet without Vitamin C.

I. INTRODUCTION:

The silkworm nutritive requirement is very different and most of it is fed with mulberry leaves. Although the mulberry leaves are complete diet for silkworm it is possible that some deficiencies may affect higher yield because the production of good quality and quantity of silk depends on larval nutrition and healthy larvae.

The productivity and quality in sericulture depends on the nutrition, growth of larvae and the environmental conditions. Growth and development in the productivity depends on the intricate physiological process of silkworm. Nutritional backgrounds of the larval stages significantly influence the status of the resulting pupa, adult and fiber. (Aftabet al., 1998; Rahmatulla et al, 2002). Fibroin about 80% and sericin about 20% are the two proteins in the silk thread secreted by silk gland. In the final instar large amount of fibroin is secreted by the posterior region of the silk glands. The three limbs of the middle region also secrete sericin.

The rearing of young instar silkworm larvae was accomplished as described by Trivedy et.al(2000) in a rearing room designed for the purpose of maintaining a temperature of 30°C and relative humidity of 90%. On completion of 48 hours from the time of brushing, it was noticed that the larvae which accepted the artificial diet grew uniformly and remained healthy. By this time, the number of hatched eggs and the Feeding Response (FR) percentage were calculated. Nair et.al (2010)

II. MATERIALS AND METHODS:

Formulating of artificial diet can be made separately for young age and adult. Two types of diet were prepared.

1. Diet with Vitamin C, 2. Diet without Vitamin C. The compositions of diet commonly used are given in the following table:

Substance	**Dry weight (g)**			
	Diet with Vitamin C		**Diet without Vitamin C**	
	Starter	**Producer**	**Starter**	**Producer**
Dry mulberry leaf powder	15	50	15	50
Fat free soya bean powder	20	30	20	30

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Inorganic salt mixture	2	1	2	1
Cellulose powder	8	-	8	-
Agar powder	12	8	12	8
Glucose	5	10	5	10
Vitamin C (tablet)	2	2	-	-
Preservative	Added	Added	Added	Added
Antiseptic (Propionic acid)	Added	Added	Added	Added
Distilled water	300ml	200ml	300ml	200ml

For starter 1st, 2nd and 3rd instar; producer 4th and 5th instar.

Determination of Sericin and fibroin content:

To calculate sericin and fibroin content the cocoon shells were dried at 80°C in a hot air oven. The dry weights of the shells were recorded Known weight of cocoon shell was treated 0.5% KOH for 6 hours and then washed in hot water. Then the sericin of fibroin content were estimated by using the following formula (Muthu Krishnan et al., 1978).

Sericin content = Dry weight of cocoon shell (g) – Sericin content (g)

Fibroin content = Dry weight of cocoon shell (g) – Sericincontent(g)

Data analysis: Statistical analysis of the data obtained were correlation coefficient, t – Test and Anova.

Result:

Treatment	**Fibroin**		**Sericin**	
	Diet with Vitamin C (%)	**Diet without Vitamin C (%)**	**Diet with Vitamin C (%)**	**Diet without Vitamin C (%)**
T_0	79	79	20	20
T_1	81	76	18	23
T_2	82	78	17	21
T_3	77	82	22	17
T_4	80	81	19	18
T_5	79	82	20	17
T_6	77	80	22	19

Fibroin content in the cocoon L x CSR_2 was estimated in various treatments (T_0 – T_6). Among the treatment significant difference was observed for fibroin content.

L x CSR_2 the fibroin content in the cocoon of larva fed on diet with Vitamin C was recorded in T_2 (82%) followed by T_1 (81%), T_4 (80%), T_5 & T_0 were (79%) T_6 and T_3 were (77%) and the larvae fed on diet without Vitamin C was recorded T_3 and T_5 were (82%) followed by T_4 (81%), T_6 (80%), T_0 (79%), T_2 (78%) and T_1 (76%).

Sericin content in L x CSR_2 a perusal data reveal that the sericin content in the cocoon under treatment was recorded in T_3 and T_6 (22%) and followed by T_0 and T_5 (20%), T_4 (19%), T_1 (18%) and T_2 (17%) on larvae fed on diet without Vitamin

C and the larvae fed on diet without vitamin C was recorded T_1 (23%) and followed by T_2 (21%), T_0 (20%), T_6 (19%), T_4 (18%), T5 and T_3 (17%).

Discussion:

Nutrition plays an important role in improving the growth and development of the silkworm Bombyx mori . L. Like other organism studies of Ito(a) 1978 determined that generally Vitamins present in the mulberry leaves satisfy minimum needs of silkworm but the amount of vitamins present in the mulberry leaves varies on the basis of environmental conditions.

Effect of vitamin supplementation on the growth of Bombyx mori has investigated by many investigators (Faruki 2005; Etebariet.al., 2004, Rajabai et al.,2006). Ascorbic acid is usually added to silkworm food enrichment in a quantity generally varying from 1 – 2% of the dry weight of the artificial diet which is considered as optimum content of the vitamin Ito(b) 1978. In present study the fibroin content significantly increase in administration of vitamin C to silkworm through diet only in T_1 and T_2 remaining other treatment (T_3,T_4,T_5 and T_6) significantly less compared to treatment of diet without Vitamin C.

Nutritional efficiency in larval stages significantly influences the resulting pupae and adult particularly in lepidopteron insects where in adult is a non feeding stage Srivastava et.al (1982). Seo et.al (1985) opined that proteins are bio molecules play a fundamental and physiological role in growth and development of silkworms and synthesis of silk protein in silk gland during larval development. The silk gland is a reservoir for two important silk proteins such as fibroin and sericin Zhang et al (2006) Ascorbic acid is a potential stimulator of protein synthesis in the silkworm tissue and hence it could be used at lower concentration for the benefit of sericulture industry (Thilsathfatima 2012).

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