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# Nutritional Supplement and its Effect on Mulberry Silkworm *Bombyx mori* L

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**ABSTRACT:** Mulberry silkworm *Bombyx mori* L, reared on mulberry plant is a commercial exploited variety used on large scale production of silk. One of the most important characteristics of the silkworm *B. mori* L is its ability to switch plant proteins to silk proteins. The fortification of mulberry leaves by supplement nutrient is a recent technique in advanced sericulture research. There are numbers of artificial food such as, royal jelly, dietary proteins, amino acid, vitamin B<sub>3</sub> and vitamin B<sub>6</sub>. This review mainly focuses on some artificial nutrient supplement to *Bombyx mori*.

**KEYWORDS:** *Bombyx mori*, Fortified food, Dietary protein, Amino acid, Royal jelly, Vitamin.

### I. INTRODUCTION

*Bombyx mori* L commonly known as mulberry silkworm reared on mulberry plant. *B. mori* L, is a commercial exploited variety used on large scale production of silk (Mahmoud, 2013). One of the most important characteristics of the silkworm *B. mori* L is its ability to switch plant proteins from feeding material to silk proteins. The nutritional composition of mulberry leaves determine the growth and development of silkworm larvae and silk production (Seidavi *et al.*, 2005). The quality of the leaves has a Positive effect on the superiority of silk produced. The production of good cocoons is totally depends on the quality of feeding material (Ravikumar, 1988). Although the mulberry leaf is the sole natural food of *B. mori* L, under controlled laboratory conditions this silkworm can be reared on artificial diets (Saviane *et al.*, 2014). Fortification of the mulberry leaves by nutrient supplementation can be increased the quality and productivity of silk. *B. mori* L requires specific sugar, amino acid, proteins and vitamins for normal growth and development (Sengupta *et al.*, 1972). The fortification of mulberry leaves by supplement nutrient is a recent technique in advanced sericulture research (Murugan *et al.*, 1998). A number of researchers have worked on the effects of vitamin rich food fortification especially on the reproduction of *B. mori* L females (Faruki *et al.*, 1992; Saha and Khan, 1999).

### III. EFFECTS OF FORTIFIED DIET OF MULBERRY LEAVES

**Royal jelly:** Royal jelly is obtained from *Apis mellifera* colonies. The royal jelly increases moulting and larval weight of silkworm *B. mori* L. It contains acetylcholine, which is important requirement in the diet of silkworm larvae for normal moulting as well as growth (Keizo *et al.*, 1965). The rapid growth and developmental as well as increased number of eggs can be obtain by addition of royal jelly to the normal mulberry leaves (Saikatsu *et al.*, 1989). Effect of mulberry leaves fortified with royal jelly does not show any significant differences on shell weights over normal feeding silkworm (Nguku, 2007).

**Dietary Proteins:** The mulberry silkworm can be reared on different kinds of dietary protein *viz.*, soybean, black gram, mushroom and mixture of them using semi-artificial diet. Larvae feed on such diet containing soybean all over the 5<sup>th</sup> instar larvae provides the highest results on the weights of larvae, silk gland, pupa, cocoon and cocoon shell and larval duration. Again this diet gives the lowest mortality of the silkworm (Mahmoud, 2013).

**Amino acid:** The actual silk fibre fibroin is derived from four kind's amino acids *viz.*, Alanine, Serine, Glycine and Tyrosin, come from the food material of silkworm. The amino acid Alanine plays an important role in metabolism of glucose, tryptophan and organic acid. Aspergin used as aspartic acid by silkworm is one of the essential amino acids, deficiency of which results growth retardation. Supplementation of amino acids solutions, dissolved in distilled water

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by spread in fresh mulberry leaves after diluted in different concentration with feeding material at definite level is effective for improvement growth and development of silkworm, but a high level beyond the certain level does not have a positive effect (Rouhollah, 2010).

**Vitamin B3:** Vitamin B<sub>3</sub> one of the essential vitamins comes in two forms i.e., nicotinic acid and nicotinamide. Both can assure the requirement of vitamin B<sub>3</sub> in insects. It is mandatory for respiration of cells which helps the release of energy and metabolism of proteins, lipids, carbohydrates (Alhadeff *et al* 1984; Swendseid and Jacob 1994; Spallholz *et al* 1999). High-dose of vitamin B<sub>3</sub> in silkworm diet interrupted feeding as well as normal growth and development of silkworm larva. Larvae may suffer from the symptoms of “nicotinamide hypervitaminosis” such as immobility, dyspepsia, darkening of the skin and exerting brownish fluid from anus and swelling of rectal muscles (Etebari, 2004).

**Vitamin B6:** Vitamin B<sub>6</sub> known as Pyridoxine is part of the vitamin B is a water soluble vitamin stimulates the growth of silkworm. Vitamin B<sub>6</sub> is important in protein metabolism (Anonymous, 1998). Faruki (2005) reported the effects of vitamin B<sub>6</sub>, supplemented nourish on the reproductively potential *Bombyx mori* L. But result showed that all concentrations of the vitamin significantly reduced the fecundity and egg-viability of silkworm.

#### IV. CONCLUSION

From this study it can be concluded that the artificial foods are effective in increasing the protein and lipid content as well as improve the growth and development of silkworm larva. Treatment of silkworm larvae with nutrient supplement is good in improving the qualities of silk fibre which can be used for yield enhancement in sericulture industry.

#### REFERENCES

1. Alhadeff L, Gualtieri T. C. and Lipton M., Toxic effects of water-soluble vitamins; *Nut. Rev.* **42** 33–40, 1984.
2. Anonymous., Instruction manual of pyrol®. JAYSON Pharmaceuticals Ltd., Bangladesh, 1998.
3. Etebari, K. and Matindoost, L., Effects of hypervitaminosis of vitamin B<sub>3</sub> on silkworm biology. *J. Biosci.* **29** 417–422, 2004.
4. Faruki, S. I., Effect of pyridoxine on the reproduction of the mulberry silkworm, *Bombyx mori* L. (Lepidoptera: Bombycidae). Short communication. ISJ 2: 28-31, ISSN 1824-307X, 2005.
5. Faruki, S.I., Khan A.R., Mannan, A., Fecundity and fertility of the silkworm, *Bombyx mori* L. Fed on mulberry leaves supplemented with paraamino benzoic acid. *Bangladesh J. Zool.* **20**: 351-353, 1992.
6. Mahmoud M. M., Effect of Various Kinds of Dietary Proteins In Semi – Artificial Diets on the Mulberry Silkworm *Bombyx mori* L. *Egypt. Acad. J. Biolog. Sci.*, 6(1): 21-26, 2013.
7. Murugan, K., Jeyabalan, D. Senthil K.N., Senthil, N.S., Sivaprakasan, N., Growth promoting effects of Plant products on Silk worm. *J. Sci. Ind. Res.*; **57**: 740-745, 1998.
8. Nguku E. K., Muli E. M. and Raina S. K., Larvae, Cocoon and Post-Cocoon Characteristics of *Bombyx Mori* L. (Lepidoptera: Bombycidae) Fed on Mulberry Leaves Fortified With Kenyan Royal Jelly. *J. Appl. Sci. Environ.* Vol. 11(4) 85 – 89, 2007.
9. Radjabi, R., Effect of mulberry leaves enrichment with amino acid supplementary nutrients on silkworm, *Bombyx mori*. at North of Iran. *Academic journal of Entomology* 3 (1): 45-51, 2010.
10. Ravikumar, C., Western ghat as a bivoltine region prospects, challenges and strategies for its development. *Indian Silk*, 26 (9):39-54, 1988.
11. Saha, BN; Khan, A.R., The growth and development of the silkworm, *Bombyx mori* L. on feed supplemented with nicotinic acid. *Bangladesh J. Zool.* **11**: 103-109, 1999.
12. Seidavi, A.R., Bizhannia, A.R., Sourati, R., Mavvajpour, M., The nutritional effects of different mulberry varieties on biological characters in silkworm. *Asia Pac J Clin Nutr.* pp 14, 2005.
13. Sengupta, N., Singh, B.D. and Muatafi J.C., Nutrition of Silkworm ‘*B.Mori*, L. I. Studies on the Enrichment of Mulberry Leaf with various Sugars, Proteins, Amino Acids and Vitamins for Vigorous Growth of the Worm and Increased Cocoon Crop Protection. *Indian J. Sericulture*, 11-27, 1972.
14. Shike (Philadelphia: Lea and Febiger) pp 376–382
15. Spallholz J. E., Boylan L. M. and Driskel J. A., *Nutrition: Chemistry and biology* (Canada: CRC), 1999.
16. Swendseid M. E. and Jacob R. A., Niacin; in *Modern nutrition in health and disease* (eds) M E Shils, J A Olson and M, 1994.