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Fortified Component Used in Sericulture Industry

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SUMMARY

Mulberry silkworm, Bombyx mori L., commercial reared on mulberry plant leaves for large scale production of silk. One of the most important characteristics of the silkworm, B. mori L. is its ability to switch plant components into silk proteins. Fortification is recent advanced sericulture is to enrich the mulberry leaves by providing extra nutrient supplement. There are numbers of artificial food such as, royal jelly, dietary proteins, amino acid, vitamin B3, vitamin B6 etc. which perform important roles in silk production. This review mainly focuses on of different component used in sericulture and their role in increase silkworm productivity.

INTRODUCTION

Nutrition plays an important role in enlightening the growth and development of silkworm *Bombyx mori* L. The nutritional value of mulberry leaves and larval growth are the two most important factors in silk production. The nutritional quality of mulberry leaves has a big impact on larval growth and development, as well as cocoon production. The larval nutrition and silk production are inextricably linked. Silk production is greatly dependent on larval feeding and the nutritional value of mulberry leaves, as well as the production of high-quality cocoons (Etebari, 2002). The feeding of nutritionally enriched leaves to silkworm larvae resulted in improved growth and development, as well as a direct effect on the quality and quantity of silk production (Krishnaswami *et al*., 1972). Nearly 70 per cent of the silk proteins produced by silkworms are derived directly from mulberry leaf protein (Narayanan *et al.*,1967). Though mulberry leaf nutrition is balanced for silkworms, the quantity available for larval growth is insufficient due to variations in mulberry plant cultivable soil (Ito, 1978). Furthermore, silkworm larvae are extremely sensitive to changes in leaf quality and react quickly. The performance of the cocoon production is often influenced by variations in the quality of the mulberry leaves and climatic factors. As a result, research on the silkworm's nutritional ecology is critical for its commercial exploitation. For better output and to obtain higher production, quantity, and consistency of cocoons, efforts are made to research the impact of fortification of nutrient supplements such as proteins, carbohydrates, amino acids, vitamins, sterols, hormones, antibiotics, and so on. Vitamins are essential food factors that are organic in nature and are needed by an organism in small amounts to maintain normal development.

Different Fortified Component Used in Sericulture

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.

Probiotics

Probiotic along with intestinal tract and in turn improve the host intestinal balance. Impact of probiotic (*Lactobacillus*, *Saccharomyces cerevisiae* and effective microorganisms) treatment on mulberry leaves to modulate the economic parameters of larvae of *B. mori.* Impact of probiotic (*Lactobacillus*, *Saccharomyces cerevisiae* and effective microorganisms) treatment on mulberry leaves to modulate the economic parameters of fifth instar larvae of *B. mori.* Probiotic are the live microbial food supplements that benefits host by improving the microbial balance and enhancing the rapid cellular growth and development. Certain probiotic bacteria inhibit the growth of microbes. *Streptomyces noursei* are probiotic microbes which have been proved for their antibacterial activity and used as good eco-friendly management of silkworm diseases.

Egg albumin

Egg albumen contains 18 amino acids, which includes all the essential amino acids. Egg albumen resulted in improvement in commercial characteristics of silkworm. There was improvement in larval weight and

reduction in larval duration. Cocoon weight, Shell weight, Shell ratio and yield /10000 larvae by weight, showed significant improvement over control. Egg albumen can be used by the farmers to improve the leaf quality and in turn yield and quality of cocoons. The actual silk fibre fibroin is derived from four kinds of amino acids *viz.*, Alanine, Serine, Glycine and Tyrosine that come from the food of silkworm. These amino acids are easily provided to the silkworm through fortification of mulberry leaf with egg albumen.

Vitamin C

Ascorbic acid is reported to enhance the larval survival rate Nutritional background of the larval stage is significantly influenced by the status of the resulting larva, pupae, adult and silk fibre. Vitamin C exhibits the presence of certain growth stimulant activity and can be used to increase the feed efficacy in commercial silkworm rearing with reference to sericulture.

Micronutrients

Mulberry leaves with supplementary nutrients, spray or dust on the silkworm larvae with nutrients so as to improve the growth of the silkworms and in-turn the quality and quantity of silk and eggs produced. Boron is required to strengthen cell wall development, cell division. Zinc is an essential component for various enzyme activities involved in many physiological functions like energy production, protein synthesis and growth regulation. They play an important role in enhancing seed cocoon parameter. Foliar spray for quality mulberry leaf is essential and played prominent role in physiological activity of CSR2 silkworm breed and enhanced seed cocoon parameters.

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 5th 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.

Amino acid

The actual silk fibre fibroin is derived from four kind's amino acids *viz.,* Alanine, Serine, Glycine and Tyrosine, come from the food material of silkworm. Glycine is major component of silk. The amino acid Alanine plays an important role in metabolism of glucose, tryptophan and organic acid. Glutamine and aspartic acid taken by silk gland to convert into alanine which is major component of silk. Deficiency of which results growth retardation. Supplementation of amino acids solutions, dissolved in distilled water

Vitamin B complex

Supplementation with vitamin B increased the resistance against poor environmental conditions and increased body weight in silkworm.

- Vitamin B6 known as Pyridoxine is part of the vitamin B is a water-soluble vitamin stimulates the growth of silkworm. Vitamin B6 is important in protein metabolism (Faruki, 2005) reported the effects of vitamin B6, supplemented nourish on the reproductively potential *Bombyx mori* L.
- Vitamin B3 one of the essential vitamins comes in two forms i.e., nicotinic acid and nicotinamide. Both can assure the requirement of vitamin B3 in insects. It is mandatory for respiration of cells which helps the release of energy and metabolism of proteins, lipids, carbohydrates.
- Folic acid plays a major role in cellular metabolism including the synthesis of some of the components of DNA and pigment precursor. It also involved in the catabolism of histidine. The silkworm growth decreased when folic acid was eliminated from artificial diet. It determined that folic acid was phagostimulatory effects with significant increase in female and male cocoons weight and shell weight.
- Riboflavin enhances the silk production and reduced the uric acid excretion and choline and its derivatives sprayed on mulberry leaf and feeding to silkworm enhanced the fibre yield

Medicinal plant extract

Antimicrobial activity along with certain bio-active compounds in the medicinal plant extracts which reflected in the wealthy performance of the silkworm in terms of qualitative and quantitative characters. administration of acetone plant extract of *Asparagus officinalis* at 6 per cent concentration found beneficial in improving the cocoon and post cocoon parameters of some silkworm breeds.

Botanicals

The increase in larval weight is due to the enhancement of bio-availability of nutrients for digestibility and phagostimulant properties of various biochemical constituents in *Aloe vera* that are beneficial to insects and also for their better growth and development. Also increased intake, digestion assimilation of nutrients and in turn the silkworm survival rate. The improvement in shell weight with Phyto extracts may be due to increased nutritional efficiency of food which is utilized for the maximum silk protein content of the cocoon shell.

CONCLUSION

From this study it can be concluded that the nutrient supplements like vitamins, botanical extract, medicinal plant extract, egg albumin, probiotics etc. helps to increase silkworm economic traits like cocoon weight, shell weight, shell ratio and effective rearing rate and also improve the quality of silk fibre which can be used for yield enhancement in sericulture industry.

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