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Effect of Medicinal Botanical (*Ocimum sanctum*), Family, Labiateae on Commercial Parameters of the SilkWorm, *Bombyx mori, L*

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Abstract

The dietary nutritional management influences the rearing and commercial parameters of the silkworm. When silkworms were fed with mulberry leaves fortified with aqueous leaf extract of O. sanctum in the second instar, a positive response with respect to larval and commercial parameters were noticed. Highest larval weight in three instar viz third (1.341g/10 worms),fourth(5.434g/10),while in the fifth instar, at the beginning of the instar(11.802g/10 worms) in the middle(21.431g/10worms) and at the time of mounting(31.704g/10) was noticed at 3% concentration. The post cocoon characters increased with increase in concentrations. Further results showed that the maximum ERR % (84±.03),total weight 100 cocoons (132.88 ±0.89gm),average cocoon weight (1.571±0.490gm),average shell weight (0.258±0.13gm),average silk ratio(15.975±0.57) and average filament(838.01±2.6 m) was noticed at 3% leaf extract concentration. The possible significance of these results are being discussed. The overall performance of B. mori in response to the treatment showed an improvement in commercial parameters

Key words: *Ocimum sanctum, supplementation, Swarna andhra, commercial parameters, B. mori. L.*

Introduction

Sericulture is an age old agro based cottage industry with combination of rural, agricultural and industry based activities with high employment potential and economic benefits. Mulberry leaves are the sole food of silkworm *Bombyx mori, L* which is a monophagous insect. Available information on nutritional ecology of silkworm is a prerequisite for determining the health and growth of silk worm larvae and its cocoon parameters .When nutritionally enriched leaves were fed to the silkworm, its influence is clearly observed on quality and quantity of silk, while any deficit reflects the silkworm's health. The deficit in the silkworm diet can be enriched with fortification of mulberry leaves with medicinal botanicals having secondary metabolites which in turn alters the physiology of silk worm[1] .The significances of research on effect of different fortifying agents in insect nutrition can be judged from the principle of cooperating supplements, as more than 70% of the silk proteins are directly derived from the mulberry leaves[2] .In recent years, mulberry leaves are being fortified with carbohydrates[3], proteins[4] ,amino acids [5], cyanobacteria[6], phyto ecdysteroids [7] and combination of plant extracts[8,9,10] to control diseases and also to improve the economical traits of silkworm[11].It was reported that herbal tonic Alloevera improved the silk yield in mulberry silk worm

As a complementary and alternative medicine, the use of herbs have increased in last two decades and one among them is tulsi (*O. sanctum*)called by names like manjari/Krishna tulsi (Sanskrit), Tritlavee (Malayalam), tulshi(Marathi) and tulsi (Telugu) and it is one with reddish leaves. Several studies by Indian scientists suggest the antibacterial and stimulative effect of tulsi and it is described as "Dashimani shwasaharini"[12] .As there is no work pertaining to its impact on silkworm, the present work had been undertaken.

Materials and methods

Plant material

Tulsi is an annual, much branched herb, grown throughout Asia, Africa and other European countries. Plant is an aromatic, stimulant and has antimicrobial properties [13].They are important group of aromatic and medicinal plants recognized by rishi's for thousand years as an important plant in Ayurvedic medicine. It yields many essential oils and aroma chemicals rich in citral, geranial, eugenol and thymol which are important and can be harnessed for successful utilization by the industry [14]

Preparation of Extract and Treatment

The plant material was washed thoroughly with distilled water to remove the surface contaminants, after shade

Table 1 Effect of different concentrations of *O. sanctum* leaf extract on larval weight of the silkworm

Concentration of O. sanctum	III Instar	IV Instar	V Instar		
	Max weight of larvae (g/10 larvae)	Max weight of larvae (g/10 larvae)	Maximum weight		
			At beginning	In the middle	At the time of moulting
1%	1.182 ±.11	5.010 ±.083	10.112 ±1.00	20.354 ±1.02	29.854 ±2.09
2%	1.293 ±.13	5.143 ± 1.02	10.615 ±1.20	20.449 ± 2.13	30.364 ± 3.21
3%	1.341 ±.009	5.434 ±1.00	11.802 ± 1.03	21.93 ±1.08	31.704 ±1.079
4%	1.116 ± .11	4.585 ± 0.79	9.789 ± 1.11	19.110 ± 1.11	29.312 ±1.90
control	1.135 ±1.03	4.149 ±0.09	6.100 ±1.06	12.712 ±0.11	21.202 ±2.01

Each value is the mean of 3 observations $\pm SD$

Table 2 Post cocoon characters after treatment with three concentrations of *O. sanctum* leaf extract

Concentration of O. sanctum	No of cocoon harvested(NO)	Total weight of 100 cocoons (gm)	Total weight of 10,000 cocoons (kg)	Average cocoon weight (g)	Average pupal weight (g)	Average shell weight(g)	Average silk ratio (%)	Average filament length (m)
1%	**70** ±02	**100.642** ±0.8 1	**14.39** ±0.11	1.437 ±.59	**1.228**± 0.21	**0.210**±.13	**14.613** ±.67	**768.88** ±1.8
2%	**85** ±04	**129.455**±0.90	**15.14**±0.10	**1.511**±.40	**1.266**±0.37	**0.245**±.17	**16.214**±0.60	**822.93**±3.6
3%	**84** ±03	**132.88** ±0.89	**15.70**±0.01	**1.571**±0.48	**1.316** ±0.15	**0.258**±0.13	**15.975**±0.58	**838.0**±2.1
4%	**73** ±03	**111.33** ±0.89	**15.08**±0.09	**1.507**±0.47	**1.274** ±0.12	**0.230**±0.10	**15.265**±0.57	**799.0**±2.0
control	**69** ±02	**102.45** ±0.85	**13.55** ±0.08	**1.355**±0.47	**1.287**±0.12	**0.195**±0.10	**14.368**±0.55	**689.628** ±2.8

Each value is the mean ± SD of 3 observations

drying for 30-45 days. 25gms of dried powder was soaked in 150ml of distilled water overnight, then filtered through a muslin cloth and filterate were centrifuged at 300rpm for 15mins.The supernatants were maintained as stock solution[100%].From this solution, three different concentrations were prepared using distilled water ,fresh extracts were prepared on every 3rd day. *Swarna andhra* were reared up to spinning as per the standard rearing method suggested [15] using V1 mulberry variety. The leaves soaked in four different concentrations T1, (1%), T2, (2%), T3, (3%) and T4 (4%) were fortified on the silkworm feed was fed to the larvae twice (after the moult and before the moult) in the late age stage. Each treatment was replicated thrice with 100 larvae each, which were allowed to spin cocoons, the cocoons thus harvested were used for calculation of commercial parameters

Results

A significant increase in the larval weight was observed in T1-T4 and the increase was found to be relatively more in T2-T3.The mean body weight of the 5th instar larvae showed significant increase in T3 treatments when compared with the control. This implies that there are few nutrients in *O. sanctum* which are responsible for the larval growth. Also, the nutritional value of the leaf has an effect on the silkworm's larval performance which are conformity with results [16,17] which reported that mulberry leaves fortified with various concentrations of *T. procumbens, A. spinosus, C. longa and B. vulgaris* influences the larval and cocoon parameters

Economical traits

The data on selected economic characters of the silkworm, *B .mori* fed on *O. sanctum* leaf extract fortified mulberry leaves are presented on Table 2.In T3 batch, there was significant increase in economic traits when compared with the control. High cocoon yield of 15.70kgs was recorded in T3 batch as compared to low cocoon yield of 14.39 kgs [T1].The average cocoon weight, pupal weight, shell weight and silk ratio % of treated and control batches was recorded .The commercial traits improved in T3 batch when compared to low cocoon yield of 14.39 kgs in T1 batch

The present observations may be due to the phytochemical constituents such as steroids, alkaloids, flavonoids that inhibit the gut microorganisms which complete with the host for nutrients and also the ingredients have stimulative effect on the insect as these are involved in synthesis of silk proteins and nucleic acids which thereby increase silk content.

The improvement of economical traits in T3 batch could also be due to the presence of proteins and vitamins in the leaf extract [18]

The present results are in confirmation with [19, 20, 21, 22] who reported increase in commercial characters when treated with botanicals. Further, phytochemical analysis of tulsi [23] reported the presence of sterol, tanins and several aromatic compounds which exhibit antibacterial activity thereby health of silkworm is improved in turn commercial characters are enhanced .The sterol might have a combined role as a nutrient and feeding stimulant .Thus it can be concluded that these sterol in *O. sanctum* leaf play an important role in embryonic development ,hatching , larval growth and pupation [24,25]

Conclusion

The present study was only an attempt to assess the influence of *O. sanctum* which can be used as stimulant and antibacterial agent .Screening of this plants that are abundantly found in nature and within the reach of sericulturist may prove to be useful in augmenting commercial product that is cocoons

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