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NUTRITIVE CONTENTS OF DIFFERENT VARIETIES OF MULBERRYLEAVES

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ABSTRACT
Mulberry silkworm i.e. *Bombyx mori* nourishes its nutrition from its sole food plant i.e. *Morus alba.* Various biochemical techniques have facilitated the sericulture's in identifying the most nutritive mulberry variety for obtaining eminent silk. A deficiency of certain nutrients or an imbalance of nutrients in leaves causes some changes in the composition or metabolic activity of larval body (Ito, 1972).Leaves at different mulberry varieties namely S-1, S-13, S-1635, S-146,TR-10,K-2 and Mysore local grown under the agro-climate condition of Lucknow, Uttar Pradesh were analyzed for two nutritive contents i.e. total carbohydrates, crude protein. The result reveled that K-2 apical leaves(0.196mg/gm) and least value of protein content in S-146 (0.122mg/gm) in apical leaves ,in middle leaves more Protein contents in K-2 (0.284mg/gm)and least value of protein content inTR-10(0.109mg/gm) and in bottom leaves high value of protein content inS-146(0.208mg/gm)and least value of protein content in TR-10(0.128mg/gm) and more carbohydrate content were showed in TR-10 apical leaf (0.476mg/gm) and least value of carbohydrate content in S-1(0.292mg/gm) in apical leaf while in middle leaves more carbohydrate content inTR-10(0.547mg/gm)and least value inS-1635(0.257mg/gm) and in bottom leaves carbohydrate content in S-1635(0.546mg/gm) and least value in S-146(0.246mg/gm). The statistical data analysis shows that the protein content are less significant in apical leaf and bottom leaf('f'>0.05)and highly significant in middle leaf ('f'<0.05) and that the carbohydrate content are highly significant in apical leaf('f'<0.05)and less significant in middle leaf leaf and bottom leaf('f'>0.05). Overall in biochemical composition of mulberry varieties, K-2 scored maximum for most of the parameters followed by S-146, TR10 and S-1635 varieties best for sericulture industry.

KEYWORDS: Different mulberry varieties, nutritive content-crude protein, carbohydrate.

INTRODUCTION

Mulberry is the primary host plant of silkworm Bombyx mori L. which is exploited on commercial scale for production of silk in the country. The primary aim of every sericulturist is to boost the production of quality cocoons. The growth and development of the larvae and subsequently cocoon production are greatly influenced by nutritional quality of mulberry leaves (Krishnaswami, 1978). A deficiency of certain nutrients or an imbalance of nutrients in leaves causes some changes in the composition or metabolic activity of larval body (Ito, 1972). The importance of good nutrition during the first and second instars and its effect on subsequent instars and cocoon crop has also been recognizing both within and outside India (Takeuchi, 1960; Krishnaswami, *et al*., 1970 a; Bongale and Chaluvachari, 1993). The interrelationship between the protein and carbohydrate of mulberry leaves and the rearing parameters of silkworms is very much essentional.Because silkworm is a highly sensitive insect and responds sharply to changes in the feed quality. The quality of mulberry leaf was found to be highly in influenced by the varieties of mulberry cultivations, leaf harvest and preservation technique (Hori, 1976). In spite of this, the qualities of mulberry leaf also vary with age, leaf position and variety of same species. (Narayanan *et.al*,1996)also recorded some different varietal superiority of different varieties as food for silkworm greatly affects the economy of sericulture industry (Das and Sikadar,1970).As the nutritive requirement of the larvae vary with the age of maturity varies according to the physical characters of the leaves supplied to the silkworm. It is essential that the leaf quality provided to the silkworm must agree with the requirement of them. As young worms require leaves of more water content for easy ingestion, thus they should be fed with young leaves. While late age silkworms fed with the mature leaves as they have strength to cut and ingest the hard leaves. Too much mature leaves do not have sufficient protein and water for the growth of either young or mature worms and hence should not be given to the any instars. Keeping in view the importance of nutritional value (protein, carbohydrate content) of mulberry leaves in silkworms rearing. The present work has been amid to determine the protein contents, carbohydrate of 7 mulberry varieties grown in Lucknow agro climatic conditions.

MATERIALS AND METHODS

Mulberry leaves were obtained from the experimental site of Babasaheb Bhimrao Ambedkar Central University, Lucknow, and Uttar Pradesh, India. Seven different mulberry varieties namely S-146, S-1, S-13, S-1635, TR-10, K-2 and Mysore local were selected for the current investigation. 5 grams of mulberry leaves were harvested to estimate the nutritional composition such as protein contents, carbohydrate on the same day of harvesting.

Estimation of protein contents:

Protein content was quantitatively measured by Lowry's method (1959). About 0.5 gm of mulberry leaves samples apical, middle and bottom of different varieties was crushed and grinded in 5 ml of Trichloroacetic acid solution (T.C.A.). The grinded materials was collected in centrifugation tubes and centrifuged at 4000 r.p.m. for 15 minutes. The clear supernatants were collected in different test tubes and assayed for protein content by addition of Folin's reagent. The solution turns blue in colour. The

absorbance of blue colour was measured with the help of U.V. Spectrophotometer at 650 nm wavelength. The protein content was calculated by standard Boven Serum Albumin. The results were expressed in mg/gm.

Estimation of carbohydrate contents:

Carbohydrates content in different mulberry leaves samples apical, middle and bottom was quantitatively measured by Anthrone Reagent method (Ranganna S., 1998). For estimation of carbohydrates content, 0.2 g leaves of different mulberry varieties were grinded in distilled water with the help of mortar and pestle. Then leaves samples were centrifuged at 5000 rpm for 10 minute. The clear supernatants were collected in different test tubes and added 4 ml of Anthrone reagent to obtain green colour. The absorbance of green colour was taken to estimate the carbohydrate content by using U-V Spectrophotometer at 625 nm wavelength. The carbohydrates content was calculated by standard sugar solutions (Dextrose L). The results were expressed in mg/gm.

The data were subjected to one- way analysis of variance (ANOVA) and the significance of difference between the samples was determined by value of 'F' at 5 % .Values expressed are means of three replicate determinations (Mandal and Nambiar, 2002).

RESULTS

The quantitative determinations of various nutritional parameters in apical, middle and bottom leaf of mulberry like protein contents, carbohydrate are made known in Table 1 and Table 2 After the quantify the presentation of nutritional composition in different leaves samples which were collected from mulberry garden of Babasaheb Bhimrao Ambedkar Central University, Lucknow, more Protein contents in K-2 apical leaves (0.284mg/gm) and least value of protein content in S-1 (0.14mg/gm) in apical leaves ,in middle leaves more Protein contents in K-2(0.196mg/gm) and least value of protein content inTR-10(0.109mg/gm) and in bottom leaves high value of protein content inS-146(0.208mg/gm)and least value of protein content in TR-10(0.128mg/gm) as shown Table 1 and Fig. 1, 2 &3 and more carbohydrate content were showed in TR-10 apical leaf (0.476mg/gm) and least value of carbohydrate content in S-1(0.292mg/gm) in apical leaf while in middle leaves more carbohydrate content inTR-10(0.547mg/gm)and least value inS-1635(0.257mg/gm) and in bottom leaves carbohydrate content in S-1635(0.546mg/gm) and least value in S-146(0.246mg/gm)as shown in Table 2 and Fig. 4 ,5 & 6.

TABLE 1. Analysis of variance of Protein content in leaves of different mulberry varieties

Mulberry varieties	Apical leaf			Middle leaf			Bottom leaf		
	Mean	SD	CV%	Mean	SD	CV%	Mean	SD	CV%
K-2	0.196	0.0543	20.26	0.284	0.103	26.38	0.146	0.05	23.40
S-1	0.160	0.0441	23.65	0.184	0.194	76.66	0.167	0.04	71.70
S-146	0.122	0.0164	9.74	0.14	0.227	11.78	0.208	0.16	21.00
S-13	0.129	0.021	11.87	0.141	0.152	7.82	0.142	0.01	17.90
S-1635	0.168	0.0449	22.87	0.128	0.018	7.50	0.138	0.02	3.24
TR-10	0.147	0.0226	11.17	0.109	0.119	79.66	0.128	0.01	8.21
Mysore local	0.165	0.0123	5.44	0.163	0.163	114.9	0.169	0.06	6.65
Value of' F'	0.002			3.45			1.99		
Test of significance	L.S			H.S			L.S		

TABLE 2. Analysis of variance of Carbohydrate content in leaves of different mulberry varieties

Mulberry varieties	Apical leaf			Middle leaf			Bottom leaf		
	Mean	SD	CV%	Mean	SD	CV%	Mean	SD	CV%
K-2	0.363	0.0753	20.76	0.459	0.0874	19.04	0.374	0.1585	42.39
S-1	0.292	0.125	42.81	0.464	0.0667	14.37	0.519	0.0839	16.16
S-146	0.374	0.0446	11.92	0.474	0.0579	12.23	0.246	0.0163	6.62
S-13	0.326	0.0077	2.36	0.421	0.0131	3.12	0.391	0.0106	27.18
S-1635	0.313	0.1404	44.87	0.257	0.0136	5.30	0.546	0.0101	1.86
TR-10	0.476	0.0466	9.81	0.547	0.0108	1.98	0.342	0.0228	6.68
Mysore local	0.331	0.0179	5.42	0.581	0.0544	3.16	0.562	0.0094	1.68
Value of 'F'	3.47			1.67			-0.19		
Test of significant	H.S			L.S			L.S		

FIGURE 1. Protein Content in apical leaves of different mulberry varieties

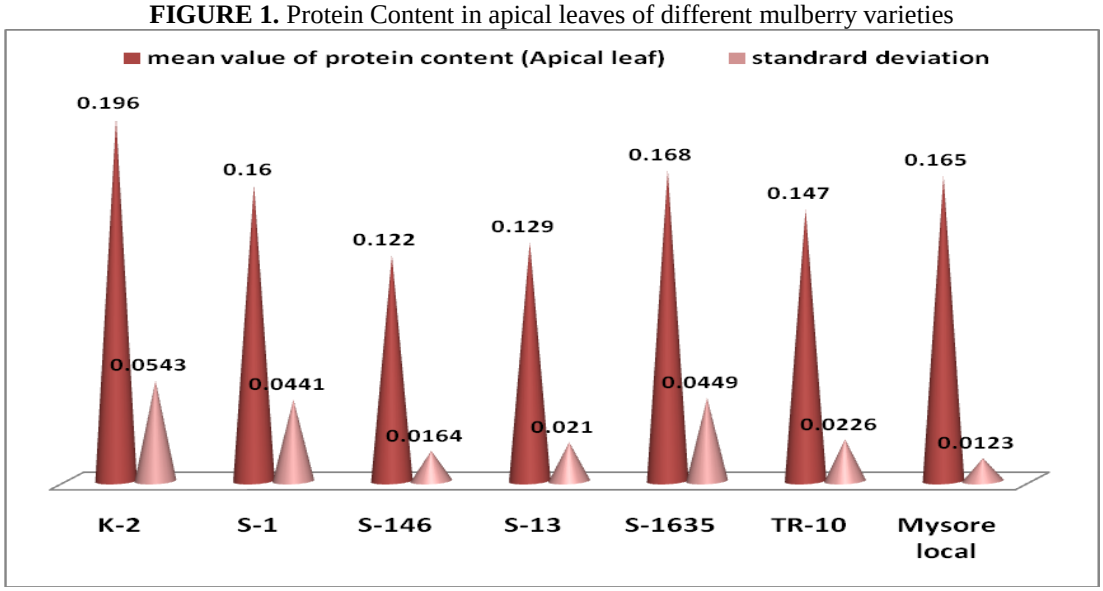


FIGURE 2. Protein Content in middle leaves of different mulberry varieties

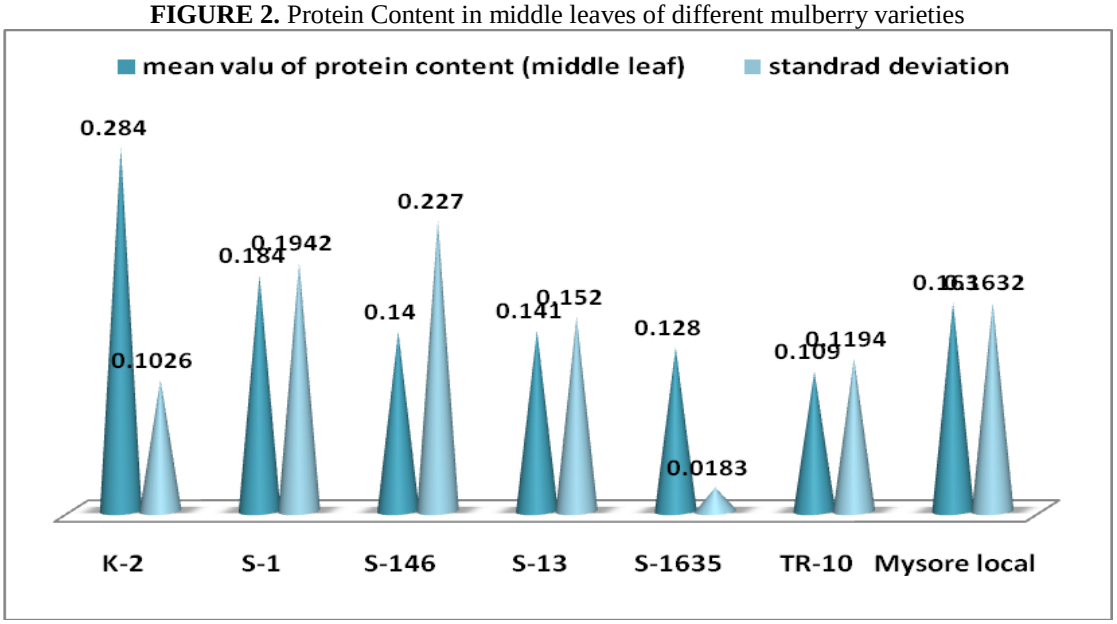


FIGURE 3. Protein Content in bottom leaves of different mulberry varieties

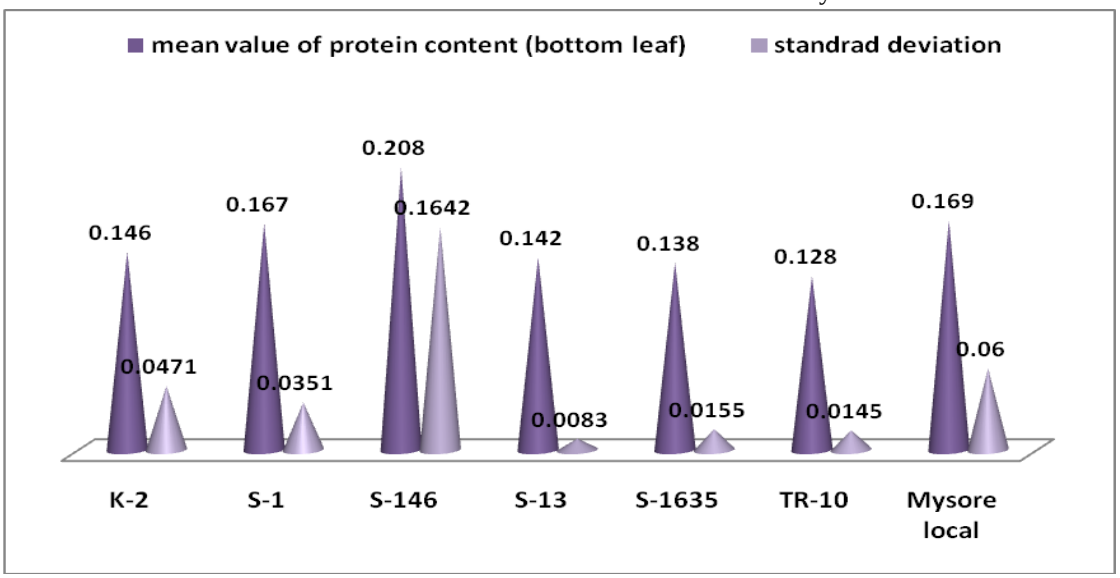


FIGURE 4. Carbohydrate Content in apical leaves of different mulberry varieties

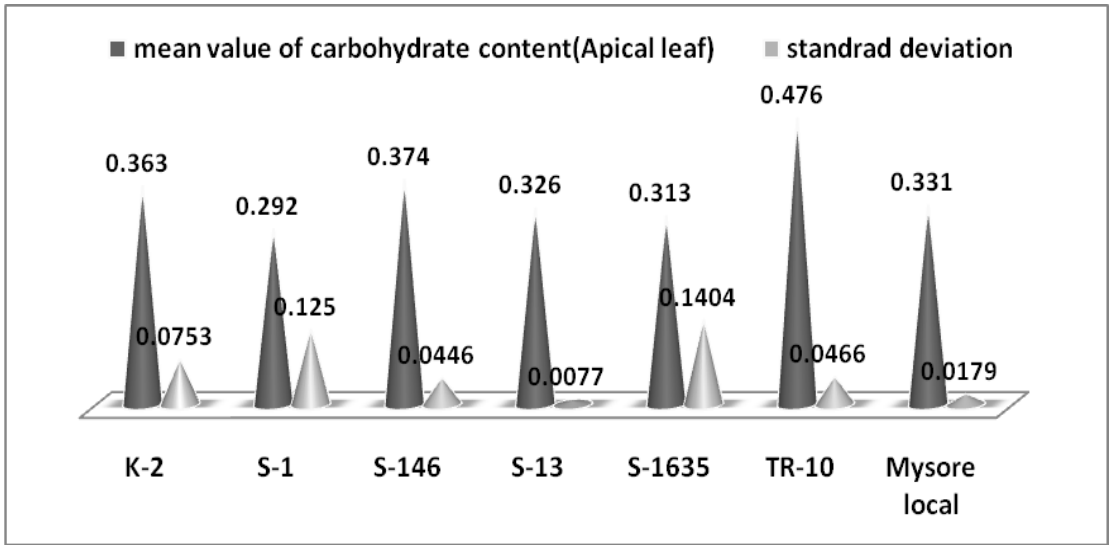


FIGURE 5. Carbohydrate Content in middle leaf leaves of different mulberry varieties

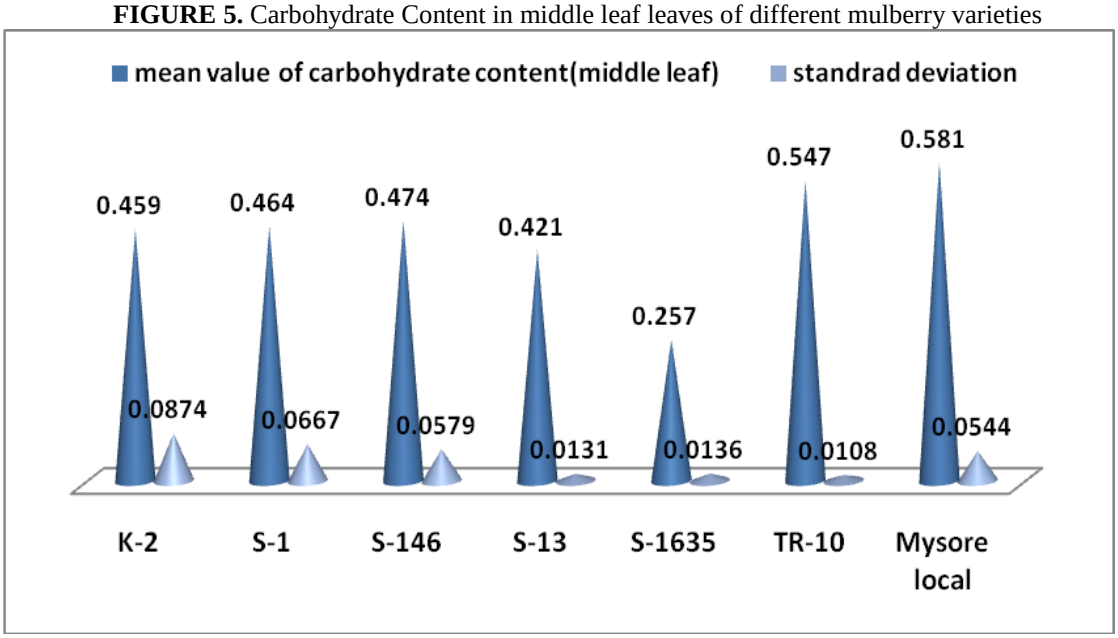
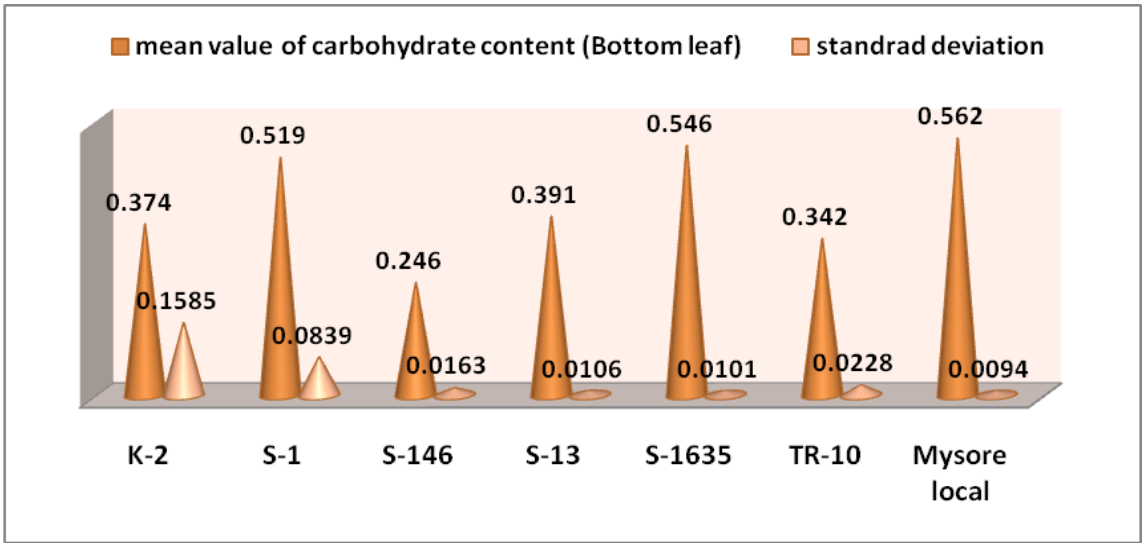


FIGURE 6. Carbohydrate Content in bottom leaves of different mulberry varieties



DISCUSSION

Krishnaswami *et.al* (1978) observed that mulberry leaves containing water, protein total sugars, soluble carbohydrates , less minerals and crude fiber is best relished and utilized by silkworm larvae. According to Bose *et.al* (1994), S-34 cultivar was having maximum value of moisture, total minerals, non-reducing sugars, total sugars, total carbohydrate and total free amino acids concluded that S-34 being the most nutritive variety in rainfed conditions while the current analysis showed S-13 and S-36 cultivars being most nutritive cultivar in irrigated conditions. Chaluvachari and Bongale, (1994) reported S-41 variety with higher protein and lower sugar content that gave higher larval duration and lower moulting ratios .Sujathamma and Dandin, (2000) found highest protein in TG, sugar content in OPH-3 and total chlorophyll in TR-4. Patil *et.al*. (2001) evaluated leaf chemical compositions in S-36, Vishwa, S-1635, S-799, and M-5 and concluded that S-1635 had highest carbohydrate. Purohit and Kumar, (1996) also observed highest total carbohydrate content in S-1635 cultivar (22.83%). A similar outcome was also found in the current findings. From the nutritional analysis of seven different varieties of mulberry leaves, it is concluded that overall in biochemical composition of mulberry varieties, K-2 scored maximum for most of the parameters followed by S-146, TR10 and S-1635 varieties best for sericulture industry.

REFERENCES

Bongale, U. D. and Chaluvachari (1993) Evaluation of four mulberry varieties by leaf biochemical analysis and bioassay with *Bombyx mori L*, J. Indian Botanical Society; 72:59-62.

Ito T. (1972) An approach to nutritional control mechanisms in silkworm *Bombyx mori*, Irael J. Entomology; 7:1-6.

Krishnaswami , S., Noamani, K. R. and Ahsan, M. (1970a) Studies on quality of mulberry leaves and silkworm cocoon crop production, Plant I Quality difference due to varieties," Indian J. Sericulture; 9(1): 1-10.

Krishnaswami , S. (1978) New Technology of silkworm rearing ", Bull No-2 CSRTI, Mysore, India: 4-5.

Lowry, O. H., Rosenbrough, N. J., Farr, A.L. and Randall, R. J. (1951) "Protein measurement with folin- phenol reagent", J. Bilo. Chem; 193: 265-275.

Mandal, R. C. C. and Nambiar, P. T. N. (2002) Agricultural statistics technique and procedures, Agro bios, Jodhpur, India.

Patil Santosh, V., Mallikarjunappa and Rao Eswar, M. S., (2001) Evaluation of mulberry (*Morus alba* L.) Leaf chemical components for silkworm (*Bombyx mori* L.) Feed", Plant archives; 1(1&2): 25-29.

Purohit, K. M. and Kumar, T. P., (1996) Influence of various agronomical practices in India on the leaf quality in mulberry, a review, Sericologia, 36(1): 27-29.

Sujathamma, P. and Dandin, S. B. (2000) Leaf quality evaluation of mulberry genotypes by chemical analysis, Sericologia.; 39(2): 117-121

Takeuchi, Y. (1960) "Ability of silkworm (*Bombyx mori* L) to recover from Malnutrition", The Silk News Letter; 5(8):6-7.