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A Comparative Biochemical Study of Three Mulberry Genotypes of Anantapuramu District of Rayalaseema of Andhrapadesh

Mandoji Mansoor Khan[1], Sankar Naik .S[2]

[1,2] Department of Sericulture, Sri Krishnadevaraya University, Anantapuramu, Andhra Pradesh, India

Abstract: ***Mulberry (Morus Spp.) is an important plant in sericulture industry as foliage constitutes the chief feed for mulberry silkworm (Bombyx mori). Investigation was carried out to evaluate the best mulberry variety from the locally available and grown mulberry varieties for silkworm feeding, based on the biochemical parameters in terms of leaf moisture, carbohydrates and proteins in respect of three mulberry verities i.e. Mysore local, V1 and S_{1635} particularly grown in Anantapuramu district of Rayalaseema region of Andhra Pradesh. Maximum nutritive values were observed in S1635 (triploid variety). Finally S_{1635} is the pick of the choice of the varieties studied.***

Keywords: Nutritive values, Mulberry, Triploid, Protein content, Mulberry diploid verities.

1. Introduction

Silk is considered to be queen of fibers which is proteinecious in nature. Rearing of silkworm for the production of silk fiber is called sericulture. Sericulture is one of the important agro based industries, which can cater the needs of agricultural based families of our rural India. The districts of Rayalaseema are experiencing with sever draught. The sericulture industry is a cumulative one with the concerted efforts of mulberry growers, silkworm reares, grainures, silk reelers, weavers and traders. Mulberry is an indispensable crop for the sericulture industry as it is the exclusive source of food for silkworms. *Bombyx mori* is a monophagous insect which feeds only on mulberry leaves. Mulberry is a genus of 10-16 species of deciduous trees native to warm, temperate and subtropical regions of Asia, Africa, Europe and America with the majority of the species native to Asia. Mulberry (*Morus* spp.) belongs to the family Moraceae, is the primary food plant for *Bombyx mori,* foliar plant with deep root system.

Mulberry leaves nutritive values plays very important role for production of quality silk through feeding to silkworm. Mulberry silkworm (*Bombyx mori)* is a monophagus insect feeds only on the mulberry leaves. The growth, development, yield, quality and disease resistance in silkworms are mainly depend on nutritive values of the leaf (Ito 1961 a, 1961 b, Horie, 1980; Haque *et.al*, 1990; Krishnaswamy *et.al*, 1991).

Sugars and Proteins are major components responsible for the silkworm growth, development and silk production. The silkworm utilizes sugars as source of energy for the synthesis of lipids and amino acids (Horie 1978, Ito 1960) emphasized that among 20 tested sugars. Sucrose strongly stimulated the feeding behavior followed by Fructose and Raffinose. Nutritive values of proteins are very important as silkworm larvae utilize the leaf nitrogenous matter for their growth and development and synthesis of silk protein (Horie 1978).

2. Materials and Methods

Three mulberry genotypes including one triploid variety S_{1635} which is developed and released from KSSRDI and remaining two diploid genotypes i.e. V1 and Mysore Local were selected. These three varieties were cultivated with 90X90 cm. spacing under irrigated conditions at Sri Krishnadevaraya University, Anantapuramu, Department of Sericulture campus.

Figure 1: Mysore local Mulberry plant

Figure 2: Raising of V1 Mulberry plants

Figure 3: Pruning of Mulberry plants

Figure 4: Mulberry fruit S_{1635}

Mulberry leaves were obtained from the Sericulture mulberry garden, Sri Krishnadevaraya University, Anantapuramu, Andhra Pradesh, India. Three mulberry genotypes (Two diploid and one triploid) namely V1, Mysore local and S_{1635} were selected. 5 grams of mulberry leaves were harvested to estimate the nutritional composition such as moisture content, carbohydrate and protein contents on the same day of harvesting.

2.1 Estimation of Moisture Content

Moisture content in different mulberry leaves samples apical, middle and bottom leaves was measured by following method. The collected leaves samples were washed in running tap water to remove dust and other residues and then water on the leaf surface was gently removed by using tissue paper, green weight of leaves was measured and recorded separately for each sample. Samples were dried at room temperature for 24 hrs. followed by oven drying at 60^{O}C for 12 hrs. and immediately dry leaf weight was measured and recorded separately for each sample respectively. Difference between green leaf weight and dry leaf weight results leaf moisture content.

2.2 Estimation of Carbohydrate contents:

Carbohydrates content in different mulberry leaves samples apical, middle and bottom was quantitatively measured by Anthrone Reagent method (**Dubios M.K, 1956**). 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).

2.3 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 genotypes separately washed well to remove surface dust and other residues then the leaf samples were crushed and grinded in 5 ml of Trichloroacetic acid solution (T.C.A.). The grinded materials was collected in centrifugation tubes and ce*n*trifuged 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.

3. Results

The study to determine the nutritive value of mulberry (*Morus spp,)* leaves was conducted. Here three genotypes of mulberry (V1, Mysore local and S1635) were taken for the test various nutritional parameters in tender, medium and cores leaf of mulberry i.e. moisture content, carbohydrate and protein contents. S1635 recorded highest nutritive values comparatively among the selected genotypes, highest Moisture content was recorded in tender leaves of S1635 (78.32% in rainy season) and least value of Moisture content in cores leaves of Mysore local (70.47% in summer season), highest Carbohydrate content was recorded in cores leave of S1635 (40.71mg/g in rainy season) and least carbohydrate content was recorded in tender leaves Mysore local (33.88 mg/g in summer season) and highest protein values were recorded in medium leaves of S1635 (238.84 mg/g in rainy season) and least proteins values were recorded in tender leaves of Mysore local (188.92 mg/g in summer season) as shown in tables.

Table 1: Moisture Percentage

Parameter	Season	Type of Leaf	V1	Mysore Local	S_{1635}
Moisture Percentage	Rainy	Tender	75.89	73.69	78.32
		Medium	74.68	73.02	77.41
		Coarse	73.88	71.93	76.73
	Winter	Tender	75.58	73.00	77.88
		Medium	74.36	72.18	76.21
		Coarse	73.67	71.33	74.98
	Summer	Tender	74.11	72.8	76.63
		Medium	73.41	71.36	75.42
		Coarse	72.3	70.47	74.12

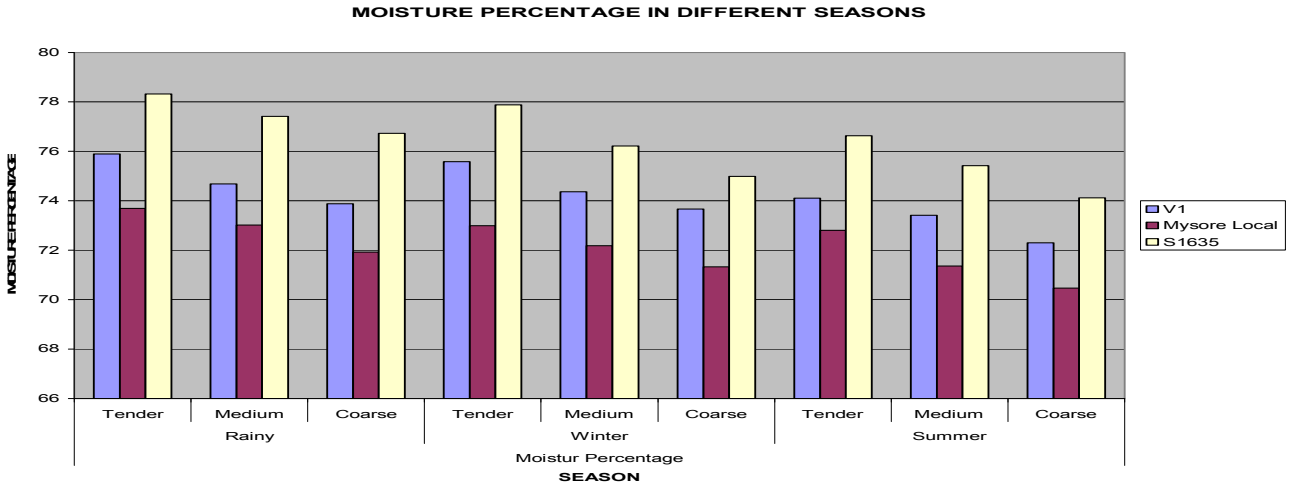


Table 2: Proteins

Parameter	*Season*	*Type of Leaf*	*V1*	*Mysore Local*	S_{1635}
Proteins	Rainy	Tender	213.13	194.18	229.73
		Medium	224.27	208.82	238.84
		Coarse	221.1	202.17	232.46
	Winter	Tender	211.13	190.92	223.63
		Medium	222.15	204.18	231.47
		Coarse	220.42	200.46	229.48
	Summer	Tender	210.08	188.92	220.09
		Medium	216.08	198.08	226.08
		Coarse	211.26	192.82	221.46

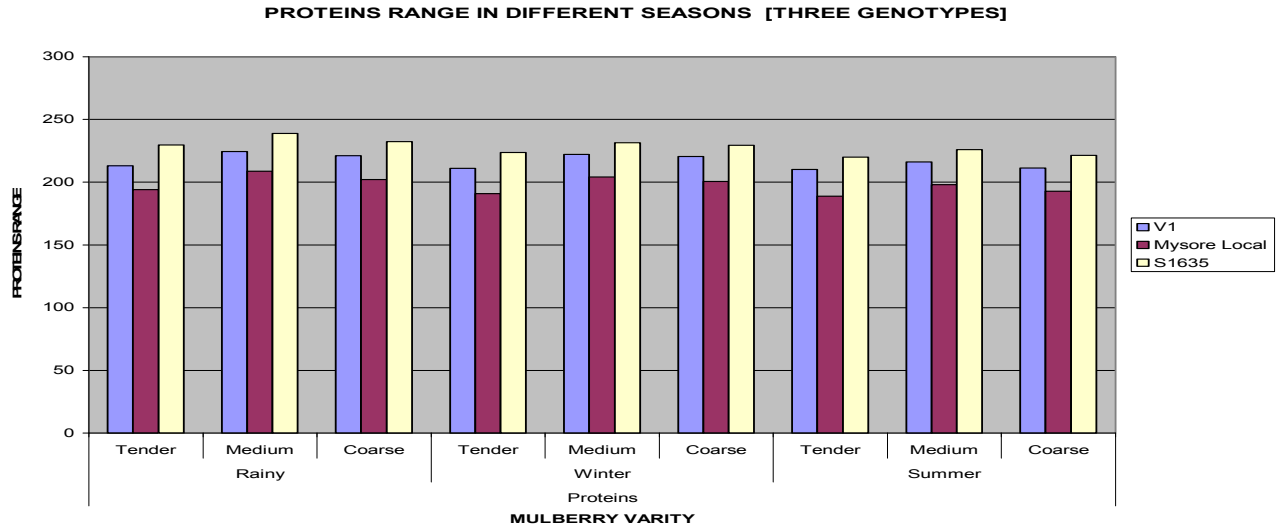
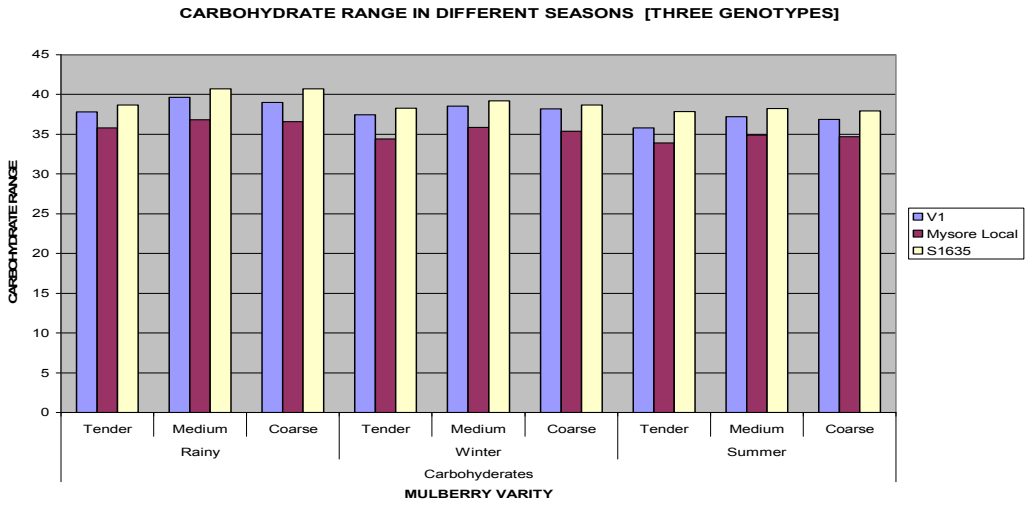


Table 3: Carbohydrates

Parameter	*Season*	*Type of Leaf*	*V1*	*Mysore Local*	*S1635*
Carbohydrates	Rainy	Tender	37.8	35.78	38.69
		Medium	39.62	36.82	40.7
		Coarse	38.98	36.59	40.71
	Winter	Tender	37.44	34.42	38.25
		Medium	38.53	35.84	39.18
		Coarse	38.21	35.38	38.68
	Summer	Tender	35.78	33.88	37.84
		Medium	37.2	34.91	38.24
		Coarse	36.86	34.69	37.91



4. Discussion

In the present study three mulberry genotypes i.e. S1635, Mysore local and V1 were selected to evaluate polyploidy difference of mulberry nutritive values.

The genotypic differences with respect to the leaf yield are well documented (Sikdar, 1990) Sarkar et al. (1983) reported that triploid Mulberry variety produce more leaves than the diploid and tetraploid varieties in pre-monsoon season.

Chaluvachari and Bongale (1993) also recorded leaf quality variation between the diploid and triploid varieties and also reported that the triploid varieties recorded distinctly highest values of leaf protein, sugars and mineral contents associated with superior rearing performances and bioassay moulting test parameters.

Dwivedi et al., (1988,1989) reported that the leaves of polyploids are thick, coarse dark green in color and larger in the size and also reported that triploid recorded highest leaf weight and higher water content and Rahman et al., (1999) reported that triploid showed faster grown rate associated with higher values of leaf yield per unit area.

5. Conclusion

From the results obtained through the different biochemical tests, among the three genotypes of mulberry S-1635 suggested as a best genotypic variety. Because S_{1635} has high nutritive value compared with the other two genotypes, also its growth and yield parameters is more convenient compared with other types. So, triploid mulberry Varity S_{1635} gives good yield and also recommended as a best genotypic feed with high nutritive value for the Silkworm. Other recommended genotypes have less quality compared with S_{1635}. The genotypes are recommended as follows based on their nutritive values, S_{1635}, V1 and Mysore local. The above result and discussion confers S_{1635} has high nutritive value compared with the other 2 genotypes also its growth and yield parameter is more convenient compared with other types. So, triploid mulberry Varity S_{1635} gives good yield and also recommended as a best genotypic feed with high nutritive value for the Silkworm.

6. Future Scope

Triploid Mulberry verities will provide more nutritive values compared to diploid verities. Triploid mulberry Varity S_{1635} gives good yield and also recommended as a best genotypic feed with high nutritive value for the Silkworm.

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Author Profile

Mandoji Mansoor Khan has done M.A., M.Sc., B.Ed., M.Phil., Ph.D. At present he is working at the designation of SRF, U.G.C. MANF at department of Sericulture, Sri Krishnadevaraya University, Anantapuramu, Andhra Pradesh, India. His area of specialization includes Mulberry Tissue Culture. He has Research Experience of 7 years in Mulberry Tissue Culture.