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Influence of various mulberry genotypes on growth and yield components of seed crop pure Mysore race Multivoltine silkworm (*Bombyx mori* L.)

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Abstract
Nutritional status of the mulberry leaves is very important and largely affects the performance of *Bombyx Mori.* Therefore, the experiment, conducted at P3/P2 Basic seed farm Nagenahally, comes under NSSO, CSB, Bangalore during 2016-17 to study the Influence of mulberry genotypes on growth and yield components of Pure Mysore race Multivoltine Silkworm. The experimental results revealed significantly lower larval duration (27.35 days) and highest weight of 10 larvae (26.37 g), yield per 100 dfls (39675 and 45.24 kg respectively), number of cocoons per kg (871), single cocoon weight (1.147), single shell weight (0.175 g), SR percentage (15.23%) and pupation percentage (96.79%) recorded with the mulberry genotype Victory-1 compared to Genotypes S36 and Kanva-2 (M-5).

Keywords: Mulberry, SR percentage, *Bombyx Mori* and NSSO

Introduction
Sericulture is an agro-based rural industry having tremendous employment potential and foreign exchange earnings. About 4 million people are engaged directly or indirectly in sericulture's activity in India (Chowdhary, 1984). We are at second position in silk production by producing 17550 MT of silk in the world after China and India is only the country having distinction in the world for all four type of silkworm in silk production *viz*., mulberry silkworm (*Bombyx mori* L.), Tasar silkworm (*Antheraea mylitta*), Eri silkworm (*Philosamia ricini*) and Muga silkworm (*Antheraea assamensis*). Mulberry plant is the most preferable by mulberry silkworm; mulberry (*Morus alba*) plant is native of Indo-China particularly from lower slopes of Himalayas. Its leaves from basic food material for mulberry silkworm leaves can also be used as fodder for cattle which increase milk production in cattle by 10 percent (Anonymous, 1991). The component of leaf varies according to the variety and good cocoon production is mainly depending on factors like quality of mulberry leaf and management. Growth and development of silkworm Bombyx mori L. and cocoon crop yield are mainly influenced by yield and nutritional quality of mulberry leaf used as feed (Yokoyama, 1963; Bongale and Chaluvachari, 1995) [12, 1]. Superiority of different mulberry varieties used as food for silkworm larvae greatly affects the economy of sericulture industry (Das and Sikdar, 1970) [4]. Nutritive value of mulberry (Morus spp.) leaf is a key factor besides environment and technology adoption for better growth and development of the silkworm larvae and cocoon production. Matsumara (1951) [7] and Bose (1989) [3] reported that, among the various factors influencing silkworm growth and cocoon production, leaf quality plays a major role. It is a confirmed fact that, leaf quality differs among mulberry varieties which in turn responsible for the difference in silkworm rearing performances. Leaves of superior quality enhance the chances of good cocoon crop (Ravikumar, 1988) [10]. To increase cocoon production and to reduce labour cost, it is advisable to choose mulberry variety which is suitable for particular set of a condition hence, the investigations were conducted know the superior mulberry variety at Multivoltine Silkworm rearing for Kunigal seed area of Karnataka.

Materials and Method
Experiment was carried out at Multivoltine Basic Seed farm, Nagenahally, Kunigal, National Silkworm Seed Organization, Central Silk Board, during 2016-17 under irrigated condition. Experiment consisted of three treatments in the farm of three mulberry varieties namely V1,

S36 and K2, and replicated seven times. Multivoltine Pure Mysore silkworm was used as an experimental material by feeding with three mulberry varieties leaves of victory V1, S36 and K2 mulberry variety. In the present study a cellular experimental rearing was conducted with one dfls per treatment and replication by standard rearing procedure developed by CSR&TI Mysore and three feedings schedule (5 a.m., 12 p.m. and 7 p.m) in a day was followed (Krishnaswami, 1978; Rajan *et al.*, 2001) [6, 9]. The temperature (27- 28°C and 23- 25°C) and humidity (85- 90% and 65- 70%) during young age and late age silkworm rearing respectively was maintained. Rearing was carried out in trays and for each replicate 300 larvae was maintained after the fourth moult. All the agronomic inputs were applied to each variety after pruning as per the package of practices given by CSR&TI, Mysore and NSSO H.O. The mean Observation on the quality parameters per replication taken from the experiment at different stages were subjected to statistical analysis (Gomez and Gomez, 1984) at P = 0.05. And means were compared using Duncan's Multiple Range Test (DMRT) using SPSS 16.0 version. Third order interactions were presented and discussed in the article.

Results

Results of the investigation on Influence of mulberry genotypes on growth and yield components of Pure Mysore Multivoltine silkworm in Multivoltine Basic Seed farm, Nagenahally, Kunigal, National Silkworm Seed Organization, Central Silk Board, 2016-17 under irrigation are presented in this chapter. The experimental results revealed the lots of significant variations statistically on moulting ratio and rearing parameters of multivoltine silk worm (Table 1 &2). Multivoltine silkworm feed with Victory-1 (V-1) mulberry leaf recorded significantly highest hatching percentage (96.87%), lowest larval duration (27.55 days), weight of 10 matured larvae at fourth moult 5th day (26.37 g), single cocoon weight (1.147 g), and lowest number of cocoons per kg (871), yield per 100 dfls 39675 by number and 45.2 Kg by weight, single cell weight (0.175), and highest pupation rate (96.79) when compared to other mulberry varieties. Whereas significantly lowest hatching percentage, larval duration, weight of 10 larvae, single cocoon weight, highest cocoon per kg yield per 100 dfls by number and weight, single cell weight and lowest pupation rate (95.05%, 29.50 days, 23.57 g, 1.110 g, 9s00, 34851& 38.45, 0.172 and 93.61) were recorded in the worm feed on Kanva-2 (K-2) mulberry variety.

Table 1: Fecundity, hatching percentage, larval duration (days), weiht of 10 larvae, sinle cocoon weight (g) and cocoons per kg of multivoltine silkworm as influenced by different varieties

Treatments	Fecundity	Hatching%	Larval duration (days)	Weight of 10 larvae (g)	Single cocoon weight (g)	Cocoons per kg (Nor)
T1 Variety V_1	491^a	96.87^a	27.35^c	26.37^a	1.147^a	871^c
T2 Variety S36	491^a	95.68^a	28.85^b	25.54^b	1.128^b	885^b
T3 Variety K2	491^a	95.05^a	29.50^a	23.57^c	1.110^b	900^a
S.Em±	0.69	0.31	0.21	0.23	0.04	3.29
C.D. 0.05	NS	NS	0.65	0.73	0.13	10.09
C.V	0.40	0.50	1.95	2.48	0.97	0.96

Table 2: Yield per 100 dfls, single cell weight, SR% and pupation rate of multivoltine silkworm as influenced by different varieties

Treatments	Yield per 100 dfls				
	By number	By weight (kg)	Single cell weight	SR%	Pupation rate
T1 Variety V_1	39675^a	45.24^a	0.175^a	15.23^b	96.79^a
T2 Variety S36	37302^b	41.95^b	0.174^b	15.38^b	96.20^a
T3 Variety K2	34851^c	38.45^c	0.172^c	15.49^a	93.61^b
S.Em±	320	0.35	0.0003	0.06	0.25
C.D. 0.05	997	1.10	0.001	0.20	0.79
C.V	2.27	2.59	0.44	1.10	0.70

Plate 1: Layout of an experiment with three treatments (varieties and seven replications) in rearing room

Plate 2: Cocoons harvested from the three different mulberry varieties

Discussion and Conclusion

Growth and development of silkworm *Bombyx mori* L. is known to vary depending on the quality and quantity of mulberry leaf used as food source, which in turn indicated by commercial characteristics of cocoon crop (Das and Sikdar, 1970; Krishnaswami *et al*., 1970; Opender Koul *et al*., 1979; Tayade and Jawale, 1984) [6, 4, 11]. Several reports are available on the evaluation of mulberry varieties through silkworm rearing performances (Narayanan *et al*., 1966 and Das and Vijayaraghavan, 1990) [8, 5]. It is quite evident that tender, succulent and nutritious leaves are known to favor the good growth and development of young age silkworms whereas progressively mature leaves with less moisture content are required for late age silkworms. In the investigation rearing performance of silkworm race differed significantly with different mulberry variety when they are subjected to same conditions, some of them. Present study also confirms that mulberry variety plays a promising role in silk worm rearing as tested. Among three mulberry varieties i.e. V1 S36 AND K2 evaluated to know the effects on PM silkworm, silkworm larvae fed on variety Victory-1 (V1) leaves showed higher larval weight and improved economic in comparison to other varieties. The highest mounting and rearing characteristics with this mulberry variety is might be due to quick sprouting ability, capacity of absorbing the available resources quickly high yielding ability and more nutritive value of the leaf (78% moisture, 27% protein and 26% carbohydrate) results in the higher and consistent growth rates of PM Silk Worm compared to other mulberry variety during entire rearing period.

Finally, it has been concluded that all the moulting and rearing performance of Pure Mysore Multivoltine Silkworm proved to be better when fed with V1 mulberry variety leaves. Cocoon characters were recorded with V1 mulberry variety proved promising. Leaves of these variety supported good growth and development of silkworm larvae, which is reflected in better cocoon characteristic features. From the results, it is reported that, mulberry variety Victory-1 (V-1) turns out to be superior in silkworm rearing compared to other varieties examined under same agro climatic conditions. Victory-1 (V-1) mulberry variety confirms to be most suitable variety for the rearing of Multivoltine Silk Worm at Kunigal seed area for sustainable growth and development of sericulture industry.

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