

## Rearing Performance and Cocoon Quality of 17 Elite Mulberry (*Morus* spp.) Genotypes with Silkworm (*Bombyx mori* L.)

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**Abstract** Silkworm *Bombyx mori* L. is an economically important insect used for silk production essentially a monophagous insect feeds solely on mulberry leaves (*Morus* spp.) as the sole natural food. The nutritional status and quality of the leaf consumption forms the basis for selection of suitable mulberry germplasm. Out of these, we have selected 17 genotypes for the present study. All the genotypes noticed significant difference in all the rearing parameters. Among these, MI-79 recorded minimum total larval duration (25.31 days), maximum mature larval weight (27.88 g/10 larva), single cocoon weight (1.769 g), shell weight (0.341g), shell ratio (19.48%), pupal weight (1.128 g), silk productivity (4.179 cg/day), ERR (93.66%), silk filament length (779.61 m), filament weight (0.255 g) and denier (2.944). The next best genotype were, MR-2, Surat local and MI-0142. But, none of the genotypes recorded maximum rearing parameters than the comparison check variety V-1. Hence, among all the selected genotypes, MI-79, MR-2, Surat local and MI-0142 genotypes out gone

as superior with respect to rearing performance and cocoon parameters with silk quality.

**Keywords** Rearing performance, Cocoon quality, Elite mulberry, Genotypes, *Bombyx mori*.

### Introduction

Mulberry (*Morus* sp.) is the primary host of silkworms (*Bombyx mori* L.), belongs to family Moraceae and it is being exploited on a commercial scale for quality leaf production. The extent of silk production is directly influenced by quality and quantity of leaf produced. Silkworm responds to nutritional parameters, which are provided through mulberry varieties. The nutritional status and quality of leaf consumption forms are the basis for selection of suitable mulberry germplasm. The mulberry genotypes present in the germplasm are necessarily requires evaluation based on leaf yield, leaf quality and silkworm rearing. The generalized effect of mulberry variety on silkworm rearing is observed significant differences in survival and cocoon characters due to mulberry genotypes. Therefore, present study was conducted to assess leaf quality of selected mulberry genotypes using commercial hybrid PM × CSR<sub>2</sub>.

### Materials and Methods

Studies on present topic were carried out during

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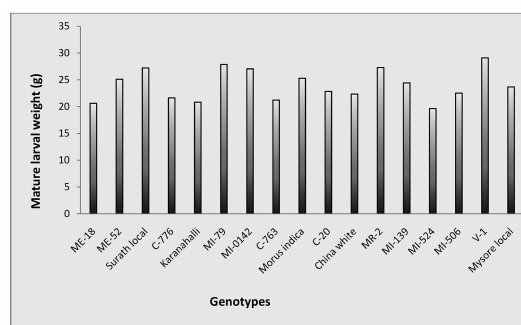
**Table 1.** List of 17 elite mulberry genotypes used in study.

Sl. No.	Genotypes	Source
1	ME-18	CSGRC, Hosur
2	ME-52	CSGRC, Hosur
3	Surat local	CSGRC, Hosur
4	C-776	CSGRC, Hosur
5	Karanahalli	CSGRC, Hosur
6	MI-79	CSGRC, Hosur
7	MI-0142	CSGRC, Hosur
8	C-763	CSGRC, Hosur
9	<i>Morus indica</i>	CSGRC, Hosur
10	C-20	CSGRC, Hosur
11	China white	CSGRC, Hosur
12	MR-2	CSGRC, Hosur
13	MI-139	CSGRC, Hosur
14	MI-524	CSGRC, Hosur
15	MI-506	CSGRC, Hosur
16	V-1 (Check)	CSGRC, Hosur
17	Mysore local (Check)	CSGRC, Hosur

the year 2012-13 in the Department of Sericulture, University of Agricultural Sciences, Gandhi Krishi Vignana Kendra, Bangalore 65. The details of materials used, the techniques adopted for conducting the experiment is presented in this chapter. The experimental material for the present study comprised of 17 elite mulberry genotypes. V-1 and Mysore local varieties used as checks. But the high yielding variety V-1 used for comparison (Table 1). These are maintained at Department of Sericulture, UAS, GKVK, Bangalore. Each mulberry genotype was planted in 1 row with 4 plants with spacing of 2.4 × 2.5 m. These genotypes are established during 2006. The experiment was conducted in summer seasons of 2012 to 2013. All the normal cultural practices like weeding, fertilizer application measures were followed as per package of practices for rain fed mulberry genotypes (Anonymous 2010). Pruning was done at 4 feet height from the ground level. The leaves from elite mulberry genotypes were harvested after 60 days. The harvested leaves were used for silkworm rearing. The silkworm rearing was carried out using 17 elite mulberry genotypes with 3 replications, each replication comprises 100 worms (PM × CSR<sub>2</sub>).

## Results and Discussion

The rearing performance of 17 elite mulberry genotypes with popular hybrid PM × CSR<sub>2</sub> showed significant difference in mature larval weight. The

**Fig. 1.** Mature larvae weight (g) of PM × CSR<sub>2</sub> worms feed with leaves of different elite mulberry genotypes during summer season.

maximum mature larval weight of 27.88 (g/10 larvae) found when silkworm fed with genotype MI-79 followed by MR-2 (27.31 g/10 larvae). The minimum total larval duration was recorded in the genotype MI-79 (25.31 days) and MR-2 (25.56 days) but least duration recorded in check variety V-1 (24.68 days). The variation in larval weight and larval duration may be due to the difference in nutritional composition of the leaf and difference in the micro environment during rearing period. These results are in conformity with Manimegalai and Aruna (2010), who reported that highest larval weight noticed in silkworms fed with V-1 variety compared to MI-79 and MR-2 (Table 2, Fig.1).

V-1 recorded significantly maximum single cocoon weight (1.773 g) shell weight (0.352 g) and shell ratio (19.49%), followed by genotype MI-79 (1.769, 0.341 g and 19.31%) respectively. However, significantly minimum single cocoon weight (1.563 g), shell weight (0.236 g) and shell ratio (15.33%) was recorded when PM × CSR<sub>2</sub> worms were reared on leaves of genotypes MI-524. In the present investigation, V-1 recorded maximum single cocoon weight, shell weight and shell ratio than the other genotypes. These results are in conformity with Bohidar et al. (2007), who reported that highest shell weight noticed in V-1 and S 36 varieties of mulberry leaves which were recommended for feeding silkworms in order to achieve better silk yield (Table 2).

Among the elite genotypes, V-1 (1.429 g) and MI-79 (1.428 g) registered significantly maximum

**Table 2.** Rearing performance of PM × CSR<sub>2</sub> worms fed with leaves of 17 different elite mulberry genotypes during summer season. \* -Significant at 5%.

Sl. No.	Genotypes	Mature larval weight(g)	Total larval duration (days)	Single cocoon weight(g)	Shell weight (g)	Pupal weight(g)	Shell ratio (%)	Silk productivity (cg/day)	ERR (%)
1	ME-18	20.64	27.02	1.643	0.265	1.345	16.46	2.871	87.76
2	ME-52	25.11	26.24	1.729	0.310	1.386	17.92	3.531	92.45
3	Surat local	27.22	25.72	1.761	0.337	1.390	19.31	4.009	92.42
4	C-776	21.65	27.07	1.626	0.248	1.345	15.33	2.678	87.48
5	Karanahalli	20.85	27.22	1.613	0.244	1.369	14.90	2.621	86.49
6	MI-79	27.88	25.31	1.769	0.341	1.428	19.31	4.179	93.66
7	MI-0142	27.06	25.86	1.758	0.333	1.425	18.75	3.904	93.06
8	C-763	21.24	26.80	1.653	0.263	1.390	15.75	2.865	89.35
9	<i>Morus indica</i>	25.31	26.03	1.740	0.318	1.422	18.39	3.672	93.15
10	C-20	22.86	26.56	1.690	0.289	1.401	17.15	3.200	85.62
11	China white	22.36	26.65	1.673	0.273	1.400	16.16	3.003	88.27
12	MR-2	27.31	25.56	1.764	0.338	1.426	19.28	4.058	93.25
13	MI-139	24.44	26.31	1.718	0.290	1.428	16.86	3.284	88.35
14	MI-524	19.65	27.40	1.563	0.236	1.327	15.38	2.521	82.42
15	MI-506	22.53	26.70	1.663	0.266	1.397	16.26	2.917	87.50
16	V-1 (Check)	29.11	24.68	1.773	0.352	1.429	19.49	4.513	95.19
17	Mysore local	23.68	26.42	1.696	0.292	1.404	17.05	3.281	89.55
	F-test	*	*	*	*	*	*	*	*
	SEm ±	0.481	0.03	0.004	0.003	0.019	0.01	0.008	0.64
	CD at 5%	1.384	0.08	0.013	0.010	0.056	0.02	0.022	1.85
	CV%	3.467	0.19	0.452	1.974	2.412	0.07	0.404	1.24

pupal weight and the genotype MI-524 noticed minimum pupal weight (1.327 g). The silk productivity

**Table 3.** Performance of silk quality parameters of PM × CSR<sub>2</sub> worms fed with leaves of 17 different elite mulberry genotypes during summer season. \* Significant at 5%.

Sl. No.	Genotypes	Silk filament length (m)	Filament weight (g)	Denier
1	ME-18	746.31	0.233	2.810
2	ME-52	758.92	0.245	2.905
3	Surat local	770.24	0.250	2.921
4	C-776	722.32	0.229	2.794
5	Karanahalli	716.43	0.226	2.789
6	MI-79	779.61	0.255	2.944
7	MI-0142	766.23	0.249	2.925
8	C-763	748.42	0.236	2.838
9	<i>Morus indica</i>	761.46	0.247	2.919
10	C-20	752.41	0.239	2.859
11	China white	750.23	0.234	2.807
12	MR-2	772.67	0.252	2.935
13	MI-139	756.04	0.244	2.905
14	MI-524	698.84	0.224	2.775
15	MI-506	749.34	0.237	2.847
16	V-1 (Check)	786.23	0.258	2.957
17	Mysore local	754.28	0.241	2.876
	F-test	*	*	*
	SEm ±	1.093	0.004	0.026
	CD at 5%	3.142	0.011	0.075
	CV%	0.251	2.710	1.565

was significantly maximum in V-1 (4.513 cg/day) followed by MI-79 (4.179) cg/day and MR-2 (4.058 cg/day). It was significantly minimum in MI-524 (2.521 cg/day) (Ogunleye and Popoola 2012). In other hand, V-1 (95.19%), MI-79 (93.66%) and MR-2 (93.25%) registered significantly maximum effective rate of rearing as compared to other genotypes. While, it was significantly low when worms were fed with leaves of genotype MI-524 (82.42%) and the next best genotypes were C-20 (85.62%). V-1 shows maximum ERR compared to other genotypes. These results are in parallel with Yogananda et al. (2013), who reported that higher levels of biochemical composition in leaves of genotypes resulted increase in the ERR and other silkworm growth parameters (Table 2).

Further, significant difference was observed with respect to the silk filament length, cocoon filament weight and denier. When PM × CSR<sub>2</sub> worms were fed on mulberry check variety V-1, resulted in longer silk filament length (786.23 m), higher cocoon filament weight (0.258 g) and maximum denier (2.957) followed by the genotype MI-79 (779.61 m, 0.255 g and 2.944) and shorter filament length of 698 m, lowest cocoon filament weight of 0.224 g, minimum

denier of 2.775 found in silkworm fed with genotype MI-524. The present results are comparable with the findings of Yogananda et al. (2013 b) (Table 3). The food quality influences the weight of the cocoon, silk yield and physico-chemical properties of silk thread (Jalaja and Ram Rao 2008). Khan et al. (2007) evaluated 7 mulberry genotypes through bio-assays and reported that the highest filament length was recorded in Ichinose (1206 m).

### Conclusion

Effect of 17 different elite mulberry genotypes on silkworm rearing and cocoon parameters revealed that, the silkworms fed with leaves of MI-79 and MR-2 genotype were resulted in increased larval weight, decreased larval duration, maximum cocoon weight, shell weight, shell ratio, silk productivity, silk filament length, silk filament weight and denier compared to other genotypes. The result showed that there is a significant difference among the genotypes. Based on these result, genotypes MI-79 and MR-2 can be recommended for trials at field level by farmers and further it could be exploited for commercial purpose like V-1.

### References

- Anonymous (2010) www.csb.in
- Bohidar K, Sahoo BS, Singh DK (2007) Effect of different varieties of mulberry leaves on economic parameters of the silkworm *Bombyx mori* L. under Orissa climate. Bull Ind Acad Seric 11 (2) : 60—64.
- Jalaja KS, Ram Rao DM (2008) Characterization of seven mulberry genotypes for their leaf quality and bioassay with silkworm *Bombyx mori* L. Sericologia 48 (1) : 85—93.
- Khan IL, Malik GN, Dar HU, Baqal MF, Malik MA, Raja TA (2007) Evaluation of some mulberry (*Morus* spp.) genotypes through chemo and bioassay under temperate conditions of Kashmir. Ind J Seric 46 (2) : 96—102.
- Manimegalai S, Aruna GR (2010) Evaluation of improved mulberry varieties for production of leaf suitable for silk worm rearing. Bull Ind Acad Seric 14 (2) : 87—92.
- Ogunleye RF, Popoola DO (2012) Growth performance evaluation and productivity of *Bombyx mori* L. (Silkworm) fed with 3 varieties of *Morus alba* L. mulberry plant. Continental J Biol Sci 5 (2) : 7—11.
- Yogananda Murthy VN, Ramesh HL, Lokesh G, Munirajappa, Yadav BRD (2013a) Nutritional quality assessment of 10 mulberry (*Morus*) germplasm varieties through moulting test, silkworm rearing technique and economical characters of bivoltine silkworms (*Bombyx mori* L.) for commercial exploitation. Int Res J Natural Sci 1 (2) : 11—22.
- Yogananda Murthy VN, Ramesh HL, Munirajappa (2013b) Impact of feeding selected mulberry germplasm varieties on silkworm *Bombyx mori* L. through bioassay techniques for commercial exploitation. Asian J Natural & Appl Sci 2 (4) : 161—165.