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# Effect of 17 Elite Mulberry (*Morus* spp.) Genotypes on Rearing Performance of Silkworm and its Cocoon Quality

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**Abstract** Mulberry silkworm (*Bombyx mori* L.) responds to nutritional parameters, which are provided through mulberry varieties. The nutritional status and quality of the leaf consumption forms the basis for selection of suitable mulberry germplasm. The Department of Sericulture,University of Agricultural Sciences, Gandhi Krishi Vignana Kendra, Bangalore is maintaining total of 100 genotypes, out of these, we are selecting 17 genotypes for the present study. All the genotypes noticed significant difference in all the rearing parameters. Among these, MR-2 recorded minimum total larval duration (27.49 days), maximum mature larval weight (29.62 g/10 larvae), single cocoon weight (1.781 g), shell weight (0.347 g), shell ratio (19.48%), silk productivity (3.319 cg/day) and ERR (91.65%). The next best one were MI-79, 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, MR-2, MI-79, Surat local and MI-0142 genotypes out gone as superior with respect to rearing performance. On other hand silk parameters viz, single filament length (812.39 m), filament weight (0.265 g) and denier (2.936) shows maximum in MR-2 followed by MI-79 and MI-0142. But, here also none of the genotype shows maximum silk parameters than the check variety V-1. It means that, MR-2, MI-79 and MI-0142 are superior with respect to silk parameters by comparing other genotypes except V-1.

**Keywords** Mulberry, Silkworm, Genotype,17 elite.

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## 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. Mulberry responds to nutritional parameters, which are provided through mulberry varieties. The nutritional status and quality of leaf consumption forms the basis for selection of suitable mulberry germplasm. The mulberry germplasm necessarily requires evaluation based on leaf yield, leaf quality and silkworm rearing result. Though a 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 $PM \times CSR_2$.

## Materials and Methods

Studies on present topic were carried in Department of Sericulture, University of Agricultural Sciences, Gandhi Krishi Vignana Kendra, Bangalore.The details of materials used, the techniques adopted for con-

**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 | *Morus indica* | 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 |

ducting the experiment is presented. The experimental material for the present study comprised of 17 elite mulberry genotypes.V1 and Mysore local varieties used as checks. But the high yielding and rolling variety V1used for comparison (Table 1). These are maintained at Department of Sericulture, UAS, GKVK, Bangalore. Each mulberry genotype was planted in one row with four plants with spacing of 2.4 × 2.5 m. These genotypes are established during 2006. The experiment was conducted in rainy season. All the normal cultural practices as per package of practices for rain fed mulberry genotypes [1]. Pruning was done at four 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 individual genotypes reared separately with three replications, each replication comprises 100 worms ($PM \times CSR_2$).

## Results and Discussion

The plants contain all nutrients required by herbivorous insects but concentrations and proportions of these nutrients vary greatly among species. The rearing performance of 17 elite mulberry genotypes with popular hybrid $PM \times CSR_2$ showed significant difference in mature larval weight. The maximum matured larval weight of 29.62 (g/10 larvae) found in genotype MR-2 followed by MI-79 (29.42 g/10 larvae) compared to leading check variety V-1 (30.42 g/10 larvae)showed lesser mature larval weight. The maximum total larval

**Table 2.** Rearing performance of $PM \times CSR_2$ worms fed with leaves of different elite mulberry genotypes during rainy season.

| Sl. No. | Genotypes | Mature larval weight (g) | Larval duration (days) | Single cocoon weight (g) | Shell weight (g) | Pupal weight (g) | Shell ratio (%) | Silk productivity (cg/day) | ERR (%) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ME-18 | 22.23 | 28.69 | 1.592 | 0.268 | 1.324 | 16.83 | 2.815 | 84.55 |
| 2 | ME-52 | 27.02 | 28.03 | 1.732 | 0.334 | 1.398 | 18.28 | 3.687 | 89.67 |
| 3 | Surat local | 29.24 | 27.89 | 1.781 | 0.340 | 1.441 | 19.09 | 3.728 | 90.61 |
| 4 | C-776 | 22.06 | 28.69 | 1.635 | 0.253 | 1.382 | 15.47 | 2.624 | 84.50 |
| 5 | Karanahalli | 22.73 | 28.91 | 1.644 | 0.261 | 1.383 | 15.48 | 2.710 | 84.60 |
| 6 | MI-79 | 29.42 | 27.81 | 1.778 | 0.342 | 1.436 | 19.24 | 3.779 | 90.97 |
| 7 | MI-0142 | 29.11 | 27.95 | 1.776 | 0.337 | 1.439 | 18.98 | 3.703 | 90.59 |
| 8 | C-763 | 22.61 | 28.35 | 1.678 | 0.271 | 1.407 | 16.15 | 2.865 | 87.66 |
| 9 | *Morus indica* | 27.26 | 28.06 | 1.743 | 0.321 | 1.422 | 18.47 | 3.489 | 90.61 |
| 10 | C-20 | 24.34 | 28.22 | 1.696 | 0.297 | 1.399 | 17.51 | 3.225 | 84.95 |
| 11 | China white | 23.62 | 28.30 | 1.683 | 0.284 | 1.399 | 16.87 | 3.050 | 85.60 |
| 12 | MR-2 | 29.62 | 27.49 | 1.781 | 0.347 | 1.432 | 19.48 | 3.864 | 91.65 |
| 13 | MI-139 | 25.12 | 28.06 | 1.721 | 0.306 | 1.413 | 17.78 | 3.319 | 85.67 |
| 14 | MI-524 | 21.24 | 29.32 | 1.581 | 0.250 | 1.329 | 15.81 | 2.591 | 83.37 |
| 15 | MI-506 | 23.43 | 28.35 | 1.692 | 0.280 | 1.412 | 16.55 | 2.995 | 85.60 |
| 16 | V-1 (Check) | 30.42 | 27.03 | 1.862 | 0.355 | 1.507 | 19.57 | 3.980 | 92.68 |
| 17 | Mysore local | 25.12 | 28.09 | 1.706 | 0.301 | 1.405 | 17.64 | 3.251 | 87.48 |
| | *F*-test | * | * | * | * | * | * | * | * |
| | SEm ± | 0.573 | 0.15 | 0.002 | 0.002 | 0.002 | 0.004 | 0.002 | 0.70 |
| | CD at 5% | 1.647 | 0.42 | 0.006 | 0.006 | 0.005 | 0.011 | 0.006 | 2.01 |
| | CV% | 3.883 | 0.89 | 0.216 | 1.220 | 0.224 | 0.038 | 0.115 | 1.39 |

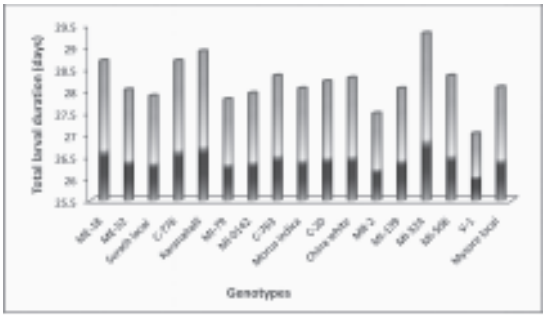


**Fig. 1.** Total larval duration (days) of PM × $CSR_2$ worms feed with leaves of different elite mulberry genotypes during rainy season.

duration (days) was recorded when silkworm fed with genotype MI-524 (29.32 days) and minimum duration recorded in check variety V-1 (27.03 days) followed by MR-2 (27.49 days) and MI-79 (27.81 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 [2], showed that highest larval weight noticed in silkworms fed with VI variety compared to MR2 and S36 (Table 2) (Fig. 1).

In addition, V-1 recorded significantly maximum single cocoon weight (1.862 g) shell weight (0.355 g) and shell ratio (19.57%), followed by genotype MR-2 (1.781 g), (0.347) and (19.48%) respectively. However, significantly minimum single cocoon weight (1.581 g), shell weight (0.250 g) and shell ratio (15.47%) was recorded when PM × $CSR_2$ worms were reared on leaves of genotypes MI-524, MI-524 and C-776 respectively. 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. [3] showed that highest shell weight noticed in V1 and S36 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 (1.507 g) and Surat local (1.441g) registered significantly maximum pupal weight and the genotype ME-18 noticed minimum pupal weight (1.324 g). The silk productivity was significantly maximum in V-1 (3.980 cg/day) followed by MR-2 (3.864 cg/day) and MI-79 (3.779 cg/day). It was significantly minimum in MI-524 (2.591 cg/day) [4]. In other hand, V-1 (92.68%), MR-2 (91.65%) and MI-79 (90.97%) 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 (83.37%) and the next best genotypes were C-776 (84.50%). V-1 shows maximum ERR compare to other genotypes. These results are in parallel with Yogananda et al. [5] showed that higher levels of biochemical composition in leaves of genotypes resulted increase in the ERR and other silk worm growth parameters (Table 2).

**Table 3.** Performance of silk quality parameters of PM × CSR2 worms fed with leaves of different elite mulberry genotypes during rainy season. *-Significant at 5%.

| Sl. No. | Genotypes | Silk filament length (m) | Filament weight (g) | Denier |
|---|---|---|---|---|
| 1 | ME-18 | 756.73 | 0.234 | 2.783 |
| 2 | ME-52 | 778.42 | 0.252 | 2.914 |
| 3 | Surat local | 799.03 | 0.258 | 2.906 |
| 4 | C-776 | 724.63 | 0.223 | 2.770 |
| 5 | Karanahalli | 732.34 | 0.228 | 2.802 |
| 6 | MI-79 | 810.36 | 0.264 | 2.932 |
| 7 | MI-0142 | 802.21 | 0.259 | 2.906 |
| 8 | C-763 | 758.62 | 0.241 | 2.859 |
| 9 | *Morus indica* | 782.31 | 0.256 | 2.945 |
| 10 | C-20 | 772.39 | 0.247 | 2.878 |
| 11 | China white | 770.81 | 0.246 | 2.872 |
| 12 | MR-2 | 812.39 | 0.265 | 2.936 |
| 13 | MI-139 | 763.29 | 0.246 | 2.901 |
| 14 | MI-524 | 720.04 | 0.221 | 2.762 |
| 15 | MI-506 | 750.26 | 0.241 | 2.891 |
| 16 | V-1 (Check) | 814.83 | 0.267 | 2.949 |
| 17 | Mysore local | 774.72 | 0.249 | 2.893 |
| | *F*-test | * | * | * |
| | SEm ± | 2.262 | 0.002 | 0.003 |
| | CD at 5% | 6.493 | 0.006 | 0.009 |
| | CV% | 0.511 | 1.556 | 0.182 |

Further, significant difference was observed with respect to the silk filament length, cocoon filament weight and denier. When PM×$CSR_2$ worms were fed on mulberry check variety V-1, resulted in longer silk filament length (814.83m), higher cocoon filament weight (0.267g) and maximum denier (2.949) followed

by the genotype MR-2 (812.39 m, 0.265 g and 2.936) and shorter filament length of 720.04 m, lowest cocoon filament weight of 0.221 g, minimum denier of 2.762 found in silkworm fed with genotype MI-524. The present results are comparable with the findings of Yogananda Murthy et al. [6] (Table 3).

The food quality influences the weight of the cocoon, silk yield and physico-chemical properties of silk thread [7]. Khan et al. [8] evaluated seven mulberry genotypes though bio-assays and reported that the highest filament length was recorded in Ichinose (1206 m).

## Conclusion

Effect of 17 different elite mulberry genotypes on silk worm 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.

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