

STUDIES ON THE EFFECT OF TWO MULBERRY VARIETIES ON THE LARVAL GROWTH AND COCOON CHARACTERS OF SILKWORM, *BOMBYX MORI* L.

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Abstract

Studies were conducted on the effect of PFI-1 and Kanmasi mulberry varieties of *Morus alba* L. on the larval growth, cocoon characters and larval and pupal mortality of 6 silkworm strains of *Bombyx mori* L. Silkworm strains fed on the PFI-1 mulberry variety showed an increment of 9.91% and 0.936% in larval and cocoon shell weight and 3.681 and 3.0 in percent shell ratio and good cocoons and a decrease of 9.4 and 7.6 in percent larval and pupal mortality than those fed on Kanmasi mulberry variety.

The PFI-1 mulberry variety, being better in all performances, is recommended for rearing silkworm for better cocoon quality.

Introduction

Pakistan Forest Institute, Peshawar has established four exotic mulberry varieties, viz. Husang (Chinese), Kanmasi (Japanese), Qumjee and Karyansubhan (Korean) and one local variety (PFI-1) of *Morus alba* L. and a Japanese hybrid mulberry, *Morus latifolia* Pors. Six strains of silkworm, *Bombyx mori* L., viz. C-102, 205-PO, 206-PO (Chinese) and J-101, 205-MKD and 206-MKD (Japanese) have also been evolved from the F1 silk seed imported from China and Japan. In the present study the comparative effect of two mulberry varieties- PFI-1 and Kanmasi has been tested on the growth and cocoon characters of silkworm strains.

Samasijah (1988) found that *Morus alba* L., *Morus cathayana* Hemsl. and *Morus multicaulis* Perr. were the most suitable and *Morus nigra* L. the least suitable mulberry species for pure silkworm races (Ax, Bx, N1 and N2) in Payakumbuh, District Sumatra. Susheelamma *et al.* (1989) found that the effect of ACC-143 and ACC-203 (S-135) mulberry varieties were superior to the other varieties and check cultivars in all the economic characters of the cocoons of silkworm, *Bombyx mori* L. ACC-143 and ACC-203 are recommended for large scale rearing of *Bombyx mori* L.

Silkworms fed on different mulberry varieties gained the highest larval and cocoon weight on *Morus macroura* Mig. (Synonym. *Morus lavigata* Wall.) and lowest on *Morus alba* L. Thus the smooth-leaved mulberry varieties are best suited for silkworm rearing and silk production (Saleem and Haq, 1984). In a comparative study on two mulberry varieties silkworms fed on *Morus laevigata* Wall. leaves gained more weight and gave better cocoon yield than those fed on *Morus alba* L. (Mahmood *et al.*, 1987). Similarly significant effect of mulberry varieties was noticed on larval weight, number and weight of cocoon per liter, single cocoon weight and percent layer of silkworm, *Bombyx mori* L. (Karimullah *et al.*, 1989).

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Petkov (1998) studied the influence of the leaves of 12 promising mulberry (*Morus*) varieties on silkworm cocoon quality and concluded that the highest cocoon quality was obtained from silkworms reared on leaves of P13, Khusan 1 and 79.

Sanjay and Srivastava (2002) tested some varieties of mulberry on the growth and development of silkworm *Bombyx mori* L. On full maturity i.e. after 25 days feeding, the maximum weight was recorded on var. S-41 (1869.73mg) followed by TR-8 (1810.96), CM (1508.8) and K-2 (1447.16), and lowest on var. S-54 (398.66).

Changalarayappa *et al.* (1999) stated that feeding leaves of S54 mulberry variety to early instars (1st and 3rd) and Mysore local to late age (4th and 5th instars) produced higher mature larval cocoon and shell weight.

Materials and Methods

Six strains of silkworm, *Bombyx mori* L, viz. C-102, 205-PO, 206-PO, J-101, 205-MKD and 206-MKD were reared in two lots in a temperature controlled rearing laboratory. In each lot 200 larvae of each strain were put in separate trays in 3 replications. Larvae of one lot were fed with PFI-1 and the other lot with Kanmasi mulberry variety 5 times per day from 1st to 5th instar. On the 6th day of the 5th instar random samples of 30 larvae of each strain (10 in each replication) of each lot were taken for recording larval weight. Larval mortality was recorded daily by checking the larvae during larval period and spinning stage. Cocooning frames were provided to the larvae for spinning cocoons. On 5th day of the cocoon formation weight of the 30 defloshed cocoon shells of each strain (10 in each replication) of each lot was recorded. Total cocoons of each strain of each lot were cut for counting the dead pupae for pupal mortality. The data were compiled and analyzed statistically.

Results and Discussions

Results of the PFI-1 and Kanmasi mulberry varieties on the larval growth and cocoon characters and the larval and pupal mortality of silkworm strains are compared in the following tables.

Table 1. The comparative effect of PFI-1 and Kanmasi mulberry varieties on the larval weight of silkworm strains

Strains	Average weight per larva fed on mulberry variety (gm)*	
	PFI-1	Kanmasi
C1-02	3.174	3.128
205-PO	3.324	2.924
206-PO	3.243	2.597
J-101	3.125	3.056
205-MKD	3.337	2.947
206-MKD	3.154	2.959
Total larval weight (gm)	19.357	17.611
% increment in larval weight of strains in PFI-1 over Kanmasi	9.91	

* Average of 30 larvae of each strain under each mulberry variety

Larvae of the silkworm strains fed of PFI-1 mulberry variety gained 9.91 %more weight than the larvae fed on Kanmasi mulberry variety. 205-MKD gained the maximum larval weight of 3.337gm per larva and J-101 the minimum of 3.125 per larva among the silkworm strains fed on PFI-1 mulberry variety. The individual mean larval weight of C-102, 205-MKD, 206-PO and J-101 silkworm strains was statistically significant.

Table 2. The comparative effect of PFI-1 and Kanmasi mulberry varieties on the cocoon shell weight of silkworm strains

Strains	Average weight per shell under larval feeding on mulberry variety (gm)*	
	PFI-1	Kanmasi
C-102	0.308	0.268
205-PO	0.258	0.286
206-PO	0.242	0.230
J-101	0.269	0.303
205-MKD	0.280	0.255
206-MKD	0.260	0.260
Total shell weight (gm)	1.617	1.602
% Increment in shell weight of strains in PFI-1 over Kanmasi		0.936

* Average weight of 30 cocoon shells of each strain under each mulberry variety.

An increment of 0.936 % occurred in shell weight of silkworm strains when fed on PFI-1 mulberry variety against Kanmasi mulberry variety though individual shell weight of 205-PO and J-101 was higher in Kanmasi mulberry variety. The individual shell weight of C-102, 206-PO, J-101, 205-MKD and 206-MKD, was statistically significant.

Table 3. The comparative effect of PFI-1 and Kanmasi mulberry varieties on the cocoon shell ratio of silkworm strains

Strains	Average shell ratio per shell under larval feeding on mulberry variety (%) *	
	PFI-1	Kanmasi
C-102	22.002	20.614
205-PO	19.398	20.516
206-PO	19.551	19.113
J-101	21.337	22.474
205-MKD	20.814	17.859
206-MKD	20.883	19.728
Total percentage of shell ratio	123.985	120.304
Increment in % shell ratio of Strains in PFI-1 over Kanmasi		3.681

* Average ratio of 30 cocoon shells of each strain under each mulberry variety.

An increment of 3.681 in the % shell ratio of silkworm strains occurred in favour of PFI-1 mulberry variety as against Kanmasi mulberry variety, though 205-PO and J-101 showed higher shell percentage in Kanmasi mulberry variety. The individual shell ratio of C-102, 205-PO, J-101 and 206-MKD was statistically significant.

Table 4. The comparative effect of PFI-1 and Kanmasi mulberry varieties on the cocoon quality of silkworm strains

Strain	Good cocoons under larval feeding on mulberry variety (%)*	
	PFI-1	Kanmasi
C-102	98.8	92.0
205-PO	93.6	90.4
206-PO	92.2	93.6
J-101	92.0	93.6
205-MKD	90.4	94.4
206-MKD	95.2	95.2
Total percentage of good cocoons	562.2	559.2
Increment in % good cocoons Of strains in PFI-1 over Kanmasi	3.0	

* = Good cocoon x 100 /total cocoon in each strain under each mulberry variety.

Silkworm strains fed on PFI-1 mulberry variety gave an increment of 3.0 in % good cocoons over the % of Kanmasi mulberry variety. As individual strain C-102 and 206-MKD yielded the highest percentage of good cocoons among all strains.

Table 5. The comparative effect of PFI-1 and Kanmasi mulberry varieties on the larval and pupal mortality of silkworm strains

Strain	% larval mortality fed on mulberry variety*		% pupal mortality under mulberry variety*	
	PFI-1	Kanmasi	PFI-1	Kanmasi
C-102	04.0	04.0	2.4	2.4
205-PO	04.8	02.4	4.8	4.8
206-PO	05.0	04.6	8.0	6.8
J-101	06.0	06.4	2.4	2.4
205-MKD	02.8	08.0	4.8	6.4
206-MKD	03.0	09.6	2.4	9.6
Total percentage of larval and pupal mortality	25.6	35.0	24.8	32.4
Decrease in % larval and pupal mortality of strains in PFI-1 over Kanmasi	9.4		7.6	

* = Dead larvae x 100/ Total larvae

* = Dead pupae x 100/ Total pupae

A decrease of 9.4 and 7.6 occurred in % larval and pupal mortality when silkworm strains fed on PFI-1 mulberry variety as compared to those fed on Kanmasi mulberry variety.

It may be concluded that the PFI-1 mulberry variety, being better in almost all performances is recommended for rearing silkworms for better cocoon quality.

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