



## QUANTIFICATION OF BOIL-OFF LOSS IN THE COCOON SHELLS OF THE SILKWORM (*BOMBYX MORI* L.) BREEDS AND THEIR HYBRIDS.

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### Abstract:

The silkworm, *Bombyx mori* L. has been reared since time immemorial due to its economic importance. The silk bave is made up of two principle proteins namely, fibroin and sericin. The removal of sericin is known as boil-off loss ratio (B.O.R). It is considered as one of the important qualitative trait during development of breeds, race authorization and even manufacture of silk fabrics.

An attempt has been made in the present investigation to record cocoon parameters and boil-off loss ratio in multivoltine races viz., Pure Mysore, Hosa Mysore, Nistari, MU303 and MU1, bivoltine breeds viz., NB4, CSR4, JROP, JRMD and P31. The hybrids (multi bihybrids) of Pure Mysore x NB7, Hosa Mysore x CSR4, Nistari x JROP, MU303 x JRMD and MU1 x P31 were also recorded. The results of the study revealed that, the multivoltine breed MU303 and bivoltine breed CSR2 excelled over other breeds for cocoon weight, shell weight, shell ratio, filament length and denier. Further, significantly lower boil-off loss was registered in MU1, NB7 and Nistari x JROP. All the hybrids expressed better heterosis over mid parental value (MPV) for boil-off loss ratio. Whereas, MU1 x P31 performed well for this trait over better parental value (BPV).

**Keywords:** Bivoltine breeds, Boil-off loss, *Bombyx mori*, Heterosis, Multivoltine breeds.

### INTRODUCTION:

The silkworm, *Bombyx mori* L. spins a protective cocoon shell by extruding silk bave at the end of its larval period in order to get protection from the adverse environment condition. The silk bave is made up of two principle proteins viz., fibroin and sericin. The fibroin forms inner core of the silk filament representing 70-80% of cocoon weight, which is surrounded by sericin accounting for 20-30% of the weight. In addition to this, little quantity of fat, wax, colouring and mineral matters of the silk bave not exceeding 2-3% (Carboni, 1952).

The main silk substance fibroin is insoluble in alkaline hot water, whereas the sericin is easily soluble in boiling alkaline soap solution (Sadov *et al.*, 1978). Without degumming, the silk cannot be called as "Queen of Textile". Degumming is the process of removal of sericin. The cocoon shell has more boil-off loss percentage when compared to the raw silk. The percentage of boil-off loss has got paramount importance in reeling and weaving activities (Kannan, 1986).

In sericulturally advanced countries, the silkworm breeders have successfully bred productive hybrids with high quality raw silk. During the course of breeding, boil-off loss is considered as one of the important qualitative traits. The boil-off ratio for bivoltine is found to be 24% (optimum) and it is genetically differing among the silkworm strains (Sinha *et al.*, 1992). The degumming loss percentage was higher in multivoltines than bivoltines due to

genetic constitution (Sidhu and Sonwalker, 1969). The contribution of sericin is highest for mulberry silk (23 to 30 %) when compared to non mulberry silk (Venugopal, 1991).

Low boil-off ratio content improved cocoon reeling qualities and is manifested by dominant genes, while recessive genes act towards the opposite direction (Gamo and Hirabayashi, 1984). The boil-off ratio varies according to seasons and also influenced by diverse environment (Sonwalker, 1969).

The silk degumming is necessary to give the silk lustrous, soft feel and to enable the penetration of chemicals and other dye stuff substances easily. The silk without sericin is used in weaving process. In India, farmers rear multivoltine x bivoltine hybrids than bivoltine hybrids for the commercial cocoon production. Hence, it is necessary to study in detail the boil-off loss ratio in the cocoon shell of multivoltine x bivoltine hybrids. In this context, the present study was undertaken to record the boil-off loss ratio in few selected parental breeds (multivoltine and bivoltine breeds) and their hybrids (multivoltine x bivoltine hybrids). In addition to this heterosis was analyzed in respect of boil-off loss ratio.

### Materials and Methods

In the present study, five multivoltine races/breeds viz., Nistari, Hosa Mysore, Pure Mysore, MU<sub>1</sub> and MU<sub>303</sub> and five bivoltine breeds viz., JROP, CSR<sub>4</sub>, NB<sub>7</sub>, P<sub>31</sub> and JRMD were drawn from the Department of Studies in