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Evaluation of locally available mounting materials on the rearing performance of mulberry silkworm, *Bombyx mori* L.

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ABSTARCT: Six different mounting materials *viz.*, Mulberry shoot mountage, Dried grass mountage, Typha grass mountage, Maize straw mountage, Wicker willow shoot mountage and Plastic collapsible mountage (control), were evaluated during the course of the present study. Maize straw mountage was found to be excellent for most of the cocoon parameters *viz.*, single cocoon weight (1.8g), single shell weight (0.430g), cocoon shell percentage (23.8%), Silk productivity (6.14cg) and pupation rate (93.11%). The reeling parameters *viz.*, average filament length (1068m), non-breakable filament length (476m), denier (2.64), raw silk percentage (16.28%) and reelability (82.35%) were also found better in newly designed Maize straw mountage. From the studies, it is concluded that maize straw can be used as an alternative mounting material for spinning cocoons by silkworm larvae with good success so that farmers can get good remuneration for their produce. The study is going to help in promoting sericulture in the tribal areas where these mounting materials are available in abundance. With this cost-effective mounting technology at their doorsteps the poor and marginal sericulture farmers can expect quality cocoon production which will help in their socio-economic upliftment by way of better remuneration for their produce.

Keywords: *Bombyx mori* L., mounting material, post cocoon, silk.

INTRODUCTION

Silkworm *Bombyx mori* L. spins silken armour around its body for protection during its metamorphosis, which forms the economical part *i.e.*, silk. Spinning is important for satisfying silkworm's physiological requirement by excreting amino acids from the body (Henry, 1984). To exploit the commercial nature of these amino acids exuded in the form of silk thread, the silkworms are domesticated and made to spin on artificial substrate which supports spinning and these structures are called mountages. The mounting material used for spinning of cocoons must be easily available, economically viable and providing adequate space for cocooning (Tanaka, 1964). It is quite evident that the mounting material or mountage plays an important role for successful seriposition (Singh *et al*., 2012). It has been observed that if the silkworm crop is healthy but wrong mounting methods, spinning conditions and bad type of mounting material can result in inferior or poor quality cocoons and silk yarn leading to lower income to farmers (Singh *et al*., 2011). It has also been observed when material and structure of the mountage are not proper, the reelability of the cocoons is reduced and other features like double cocoons, deformed cocoons and soiled cocoons get increased (Mathur and Qadri 2010). It has been observed that sericulture farmers in this part of the country are suffering huge cocoon crop losses at the terminal stage of silkworm rearing on account of using faulty mountages. Thus it was felt extremely essential to identify and develop the locally available and cost effective mountages to help the farmers to realize the full benefits of their hard labour.

MATERIAL AND METHODS

The present investigation entitled "Evaluation of locally available mounting materials on the rearing performance of mulberry silkworm, *Bombyx mori* L." was carried out during 2021 in the Division of Cocoon Crop Production at College of Temperate Sericulture,

Mirgund. Silkworm rearing was conducted as per the standard package of practices (Rajan, 2000). Procurement of the mounting material was done from the reliable sources and processed to render it free from moisture and any other contamination. Five different mountages *viz.*, mulberry shoot mountages, dried grass mountages, typha grass mountages, maize straw mountages and wicker willow shoot mountages were designed in such a way so as to create appropriate slots for cocoon formation (Plate 1).

Treatment details

Treatment	Type of Mountage	Scientific Name	Local Name
T_1	Plastic collapsible mountage	_	_
T_2	Mulberry shoots	*Morus spp.*	Tullange
T_3	Dried grass	*Oryzasativa*	Dhaneyghas
T_4	Typha grass	*Typhaangustifolia*L.	Pech
T_5	Maize straw	*Zea mays* L.	Makai
T_6	Wicker willow shoots	*Salix rubra*L.	Veer

Target crop: Silkworm (*Bombyx mori* L)
Design of the experiment: CRD
Silkworm hybrid: $CSR_2 \times CSR_4$

Observations recorded

Average filament length (m): It is the total length of the reelable silk bave of the cocoon. It was calculated as:

$$\text{Average filament length (m)} = \frac{\text{Total Filament length}}{\text{Total Number of cocoons reeled}}$$

Non-breakable filament length (NBFL) (m): It is the average length of the filament that can be reeled from the cocoon without break. It was calculated as:

$$\text{Non-breakable filament length (NBFL) (m)} = \frac{\text{Total filament length}}{1+\text{Number of breaks}}$$

Raw silk percentage (%): It was calculated by using the following formula:

$$\text{Raw silk percentage (\%)} = \frac{\text{Weight of raw silk reeled}}{\text{Weight of cocoon}} \times 100$$

Denier: Denier is the weight in grams of 9000 m of yarn or filament. It was calculated as:

$$\text{Denier} = \frac{\text{Weight of Filament(g)}}{\text{Length of Filament(m)}} \times 9000$$

Silk productivity (cg): The silk productivity gives the quantity of silk synthesized per day and was calculated by using the following formula:

$$\text{Silk productivity (cg/day)} = \frac{\text{Shell Weight}}{5^{th}\text{ Instar Larval duration in days}}$$

Reelability%: It was calculated by using the following formula:

$$\text{Reelability} = \frac{\text{No. of reeling cocoons}}{\text{No. of feeding ends}} \times 100$$

RESULTS AND DISCUSSION

Statistical analysis of the data revealed that there exists significant differences with regard to average filament length. Among the evaluated mountages Plastic collapsible mountage (control) recorded maximum (1099m) average filament length which was at par with Maize straw mountage with average filament length of 1068 meters. The average filament length recorded by other treatments include: Typha grass mountage (1025m), Mulberry shoot mountage (1022m), Dried grass mountage (1013m) and Wicker willow shoot mountage (966m) (Table 1). This receives support from the findings of Haroon *et al.*, (2018) who while evaluating different mountages has come up with the similar findings.

There was non-significant effect of the treatments on the non breakable filament length. However maximum non-breakable filament length of 533m was observed in case of plastic collapsible mountage followed by Maize straw mountage with non-breakable filament length of 476 meters. The non-breakable filament length recorded by other treatments include: Typha grass mountage (475m), Dried grass mountage (472m),

Mulberry shoot mountage (465m) and Wicker willow shoot mountage (456m) (Table 1). The effect of different mountages on the denier of silkworm *Bombyx mori* L. was found to be non-significant, however, among the evaluated mountages Plastic collapsible mountage (control) recorded least (2.60) denier followed by Maize straw mountage with denier of 2.64. Denier recorded by other treatments include: Typha grass mountage (2.84), Dried grass mountage (2.86), Mulberry shoot mountage (2.87) and Wicker willow shoot mountage (2.89) (Table 1).

Statistical analysis of the data revealed that there exists significant differences with regard to reelability. Among the evaluated mountages Plastic collapsible mountage (control) recorded maximum (84.12%) reelability followed by Maize straw mountage with reelability of 82.35 percentage. Reelability recorded by other treatments include: Typha grass mountage (81.92%), Mulberry shoot mountage (79.80%), Dried grass mountage (79.30%) and Wicker willow shoot mountage (76.97%) (Table 1). These results are in conformity with the findings of Haroon *et al.*, (2018) who evaluated five different types of locally available plant material and came up with the similar findings.

Reeling analysis of the samples revealed that significant differences exist with respect to reelability percentage. Maximum reelability of 84.12 percent was observed in case of plastic collapsible mountage which was at par with maize straw mountage with reelability of 82.35 percent. These results are in line with the findings of Haroon *et al.* (2018) who evaluated five different types of locally available plant material and came up with the similar findings. There was a significant difference among treatments with regard to raw silk percentage, Maximum raw silk percentage of 16.97 per cent was recorded in case of plastic collapsible mountages which was at par with maize straw mountage with raw silk percentage of 16.26 per cent. According to Shillin Sangappa *et al.* (2010) the structure of cocooning frame is believed to play a major role in quality of raw silk which is evidenced by the present investigation too.

Table 1: Effect of different mountages on reeling parameters of *Bombyx mori.* L.

Treatment	Average filament length(m)	Non-breakable filament length(m)	Denier	Reelability (%)	Raw silk (%)
Plastic collapsible mountage	1099^{a}	533	2.60	84.12^{a}	16.97^{a}
Mulberry shoot mountage	1022$_{bc}$	465	2.87	79.80^{c}	15.8^{b}
Dried grass mountage	1013^{bc}	472	2.86	79.30^{c}	15.18^{b}
Typha grass mountage	1025^{bc}	475	2.84	81.92^{b}	16.26^{ab}
Maize strawmountage	1068^{a}	476	2.64	82.35^{b}	16.28^{a}
Wicker willow shoot mountage	966^{c}	456	2.89	76.97^{d}	15.10^{b}
C.D (p≤0.05)	32.07	NS	NS	1.670	1.08

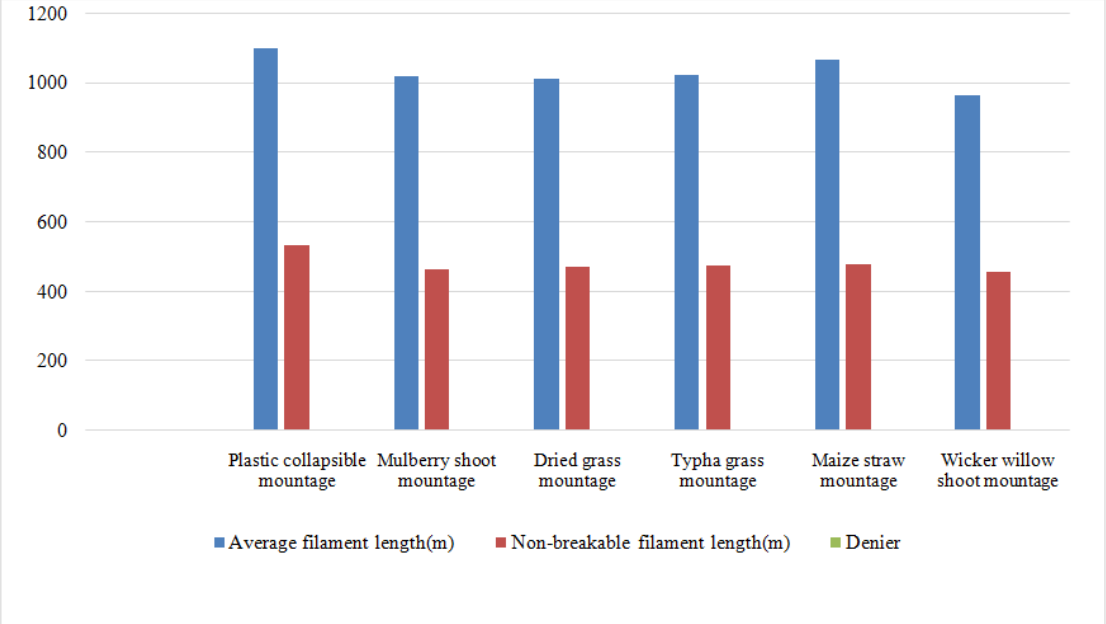

Fig. 1. Effect of different mountages on reeling parameters of *Bombyx mori.* L.

Plate1: Cocoon formation on different mountages.

CONCLUSION

The present study reveals that Plastic collapsible mountage are still performing better for most parameters of silkworm, *Bombyx mori* L. However these mountages are not readily available with the farmers owing to their high cost. Maize straw mountage which is easily available in every household in rural areas of Kashmir also performed excellently in most of the parameters and was at par with Plastic collapsible mountage for the recorded traits. The current study underlines maize straw mountages as an alternative mountage for silkworm rearers of J&K in view of its availability and eco-friendly nature besides being cost effective.

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