Journal of Entomology and Zoology Studies 2020; 8(4): 229-235

Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2020; 8(4): 229-235

Received: 22-05-2020
Accepted: 26-06-2020

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Evaluation of fabricated Mountages on cocoon yield parameters of two different silkworm hybrids of *Bombyx mori* L.

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Abstract
The study was conducted to evaluate the performance of three fabricated self mountages *viz.*, spiral, square and zig-zag mountages on various cocoon parameters in comparison with ribbon, plastic collapsible and bamboo mountages by using two different silkworm races *viz.*, the cross breed (CB) (PM x CSR2) and the double hybrid (DH) (Krishnaraja). The total number of cocoons per mountage was significantly higher in bamboo mountage (677.50) followed by spiral mountage (486.00) for CB and for DH it was highest in bamboo moutage (539.67), followed by zig-zag mountage (282.00) and the interaction effect was found significant for the same. The good cocoon number per mountage was found highest in bamboo mountage (637.61) followed by spiral mountage (459.33) for CB and for DH it was found highest in bamboo mountage (473.67) followed by zig-zag mountage (262.00) and the interaction effect was found significant. The number of defective cocoons per mountage was higher in bamboo mountage (39.83 for CB and 66.00 for DH) followed by square mountage (27.33 for DH) and zig-zag (27.00 for CB) and the interaction effect was found non significant. The correlation study results revealed that, the weight of different types of cocoon showed significantly positive relation with their number.

Keywords: Cross breed, defective cocoons, double hybrid, good cocoons, self-mounting structures

1. Introduction
The silkworms (*Bombyx mori* L.) are holometabolous sericigenous insects which complete their larval stage in about 23-27 days, where they undergo four moults for completing the larval stage. The larvae attain maturity by about seven days after fourth moult. At this stage, silkworms stop feeding, their body becomes shrunk and translucent, the silk glands are filled with silk proteins and they will be ready for spinning, which is the most productive phase in silkworm rearing. Silkworm spins silken armour around its body for protection during its metamorphosis, which forms the most economical part for human being.

The spinning of cocoons, which is also the nest for silkworms to metamorphosize into pupa, is a crucial phase among silkworm rearing, that starts with identification and collection (picking) of mature larvae and transferring them on to the cocooning structures, the process of which is defined as 'mounting'. The time and method of mounting as well as the cocooning frame, otherwise called as 'mountage', are the most important factors influencing the quality of cocoons and thereby, the raw silk yield and quality [6]. Even if the silkworm crop is healthy, improper mounting methods, spinning conditions, mounting density, mounting of pre or over matured larvae and poor type of mountages can results in inferior quality cocoons [4]. Thus, the equipments used for supporting the spinning larvae *i.e.*, the mountages play a vital role in determining quality of cocoons and price fixation at the cocoon market.

Mountage is a device for providing the platform for mature silkworms to spin cocoon. Several types of mountages are available at the field, some of which are more popular. Farmers use different locally available materials for fabricating such mountages. The studies revealed that the type of material used, design and fabrication of the mountage will decide on the quality of the cocoon. In addition to support for spinning worms, the mountages should satisfy the requirements like, providing convenient and uniform space with suitable dimension for spinning good sized cocoons, discouraging formation of double cocoons and malformed cocoons, providing ventilation for drying up of the last excreta of the worm prior to spinning, enabling easy mounting and harvesting [5]. An improper use of mounting structure and lack of care during handling and management of mature silkworms results in formation of defective cocoons accounting to a loss of about 5 to 8 per cent of cocoon yield [1].

Thus, the quantity and quality of good cocoons depend largely upon the right selection and proper use of mountages during spinning of cocoons by the matured larvae.

A significant portion of investment during commercial rearing of silkworm, *B. mori* involves in the wages towards labour. Maximum number of labours are employed during spinning, to pick and mount the ripened worms on to mountages (approximately 15 mandays per 100 DFLs out of a total of 35 mandays) which involves maximum expenditure. Though several kinds of mountages are available, each one is coupled with its own disadvantages. Most popularly used bamboo mountages are involved with high cost as they cannot be used as self mounting structures. At present, the available self mounting structures are plastic mountages which are highly suitable for bivoltine breeds of silkworms. The self mountages have a drawback, uniformity in shape, size and compactness of the cocoon cannot be maintained or assured in the self mounting plastic mountages. The reelers adopted improvised reeling machines offer less price for the cocoons harvested from plastic mountages as they experience that the cocoon shell with more moisture content which reduces the reelability and ultimately affect the raw silk quality [6]. Realizing the importance of existing mountages, the efforts have been made to study the impact of new self mountages on cocoon yield of the mulberry silkworm, *B. mori.*

2. Material and Methods

The effect of different mountages on cocoon parameters of silkworm, *B. mori* L. were studied during 2017–2018. Well established V-1 (Victory-1) mulberry plants with recommended 90 x 90 cm spacing were used for the silkworm rearing. 50 Disease Free Layings (DFLs) of each of young age silkworms of cross breed (PM X CSR2) and bivoltine double hybrid, Krishnaraja {FC1 (CSR6 x CSR26) X FC2 (CSR2 x CSR27)} were procured from Registered Chawki Rearing Centres for each rearing separately and they were reared by following the procedure recommended by [2].

2.1 Treatment details: Six different mountages *viz.*, Spiral mountage (T_1), Square mountage (T_2) and Zig – Zag mountage (T_3) were newly designed and fabricated for the present study. Thalaghattapura Ribbon Chandrike (T_4), Plastic collapsible mountage (T_5) (Control-1) and Bamboo chandrike (T_6) (Control-2) were involved for analysis. Three replications were maintained for all the treatments.

The self mounting structures (T_1 – T_5) were placed over the silkworm rearing bed for a period of one and a half hours when the silkworms attained the ripening stage. After one and a half hours, mountages were removed from the rearing bed whereas in T_6 manual mounting method *i.e.*, picking up of ripened worms and mounting on to the mountages was practiced. The cocoons were harvested from each mountage on fifth and seventh day of spinning in cross breed (CB) and double hybrid (DH), respectively which ensures complete cocoon formation. The different larval-cocoon parameters were recorded as follows:

2.2 Number of cocoons per mountage (No. mounatge^{-1})

The cocoons were harvested from each mountage on fifth and seventh day of spinning in CB and DH, respectively which ensures complete cocoon formation. The harvested cocoons were counted which includes both good and defective cocoons and it is expressed as number per mountage.

2.3 Weight of cocoons per mountage (g. mountage^{-1})

The harvested cocoons were weighed on fifth and seventh day of spinning for CB and DH respectively which includes both good and defective cocoons and average was calculated for each mountage which is expressed as gram per mountage.

2.4 Number of good and defective cocoons per mountage (g. mountage^{-1})

The harvested cocoons were segregated into good and defective cocoons and the number of good and defective cocoons were counted separately from each mountage and the average number was calculated for each replication which is expressed as number per mountage.

2.5 Weight of good and defective cocoons per mountage (g. mountage^{-1})

The segregated good and defective cocoons were weighed separately on fifth and seventh day of spinning for CB and DH, respectively for each mountage and the average weight was calculated for each replication which is expressed as gram per mountage.

2.6 Statistical analysis

The experimental data collected on various cocoon and reeling parameter were subjected to Fisher's method of analysis of variance (ANOVA) as per the methods outlined by [9]. The data were also subjected to Factorial CRD and Correlation to know the interaction effect between the mountages and silkworm hybrids and degree of relationship between different cocoon yield parameters, respectively. Wherever the interaction effect found non significant then the main effect was observed.

3. Results and Discussion

3.1 Total number of cocoons per mountage (Number mountage^{-1})

A significantly ($P\leq$ 0.01) higher number of cocoons per mountage was recorded in T_6, followed by T_1, T_3, T_2, T_5 and least was in T_4 for CB (Table 1; Fig. 1). Among DH T_6 recorded significantly maximum cocoon number per mountage while T_3, T_1 and T_2, recorded the number of cocoons per mountage on par with each other. A marked maximum number of cocoons were observed on Thalaghattapura ribbon mountage (176.00) and corrugated plastic mountage (162.00), which were on par with each other (Table 2; Fig. 1). Among the two, on an average independent of the design of the mountage the silkworm breed, PM x CSR_2 showed significantly maximum number of cocoons per mountage (363.17) than DH (284.94) (Table 3).

The interaction between different designs of mountages and the silkworm hybrids showed significant ($P\leq$ 0.01) difference with respect to number of cocoons per mountage. Significantly higher number of cocoons were harvested from the regular bamboo mountage used for mounting cross breed (677.50) followed by bamboo mountage for DH (539.67) while it was significantly lower in ribbon chandrike used for mounting cross breed larvae (136.33) that was on par with plastic mountage and double hybrid (162.00) (Table 3).

The total cocoon per mountage varied in accordance with total larvae crawled or mounted on to the respective mountages for both the breeds. In comparison, the self mounting structures alone, the spiral mountage performed with higher number of cocoons per mountage compared to the recommended plastic mountages. The studies conducted by [6], recorded highest number of cocoons per mountage on ribbon chandrike (373.00) compared to bamboo mountage (271.00). However, they did not indicate the time of exposure of the mountage for crawling of spinning larvae. The lesser number of cocoons per mountage on self mounting structures might be attributed to the mounting duration provided which was only one and a half hours on different designs.

3.2 Cocoon weight (g mountage^{-1})

In the interaction effect, cocoon weight per mountage was significantly ($P\leq$ 0.01) higher in Control 2 (1364.17 g) followed by T_1, T_3, T_2 and control 1 and it was least in T_4 for CB (Table 1; Fig. 3). The double hybrid recorded significantly ($P\leq$ 0.01) higher cocoon weight mountage in T_6 followed by T_3 and T_2, T_1 which they were on par with each other and cocoon weight per mountage was significantly lesser on T_4 and T_5 that were on par with each other (Table 2; Fig. 3). Though the weight of cocoons per mountage did not vary significantly ($P\leq$ 0.01) among the two silkworm breeds, the interaction between different mountages and silkworm hybrids had profound influence on the cocoon weight per mountage. The DH cocoons harvested from regular bamboo mountage weighed significantly ($P\leq$ 0.01) higher (1417.17 g mountage^{-1}) that was on par with CB cocoons on bamboo mountage (1364.17 g mountage^{-1}) and it was significantly least for CB on ribbon chandrike (279.33 g mountage^{-1}), which was close with DH on plastic mountage (387.67 g) (Table 3).

Irrespective of the breeds and the design of the mountage, the cocoon weight per mountage directly depends on the total number of cocoons harvested per mountage, which further varied in accordance with larval count on each mountage. Though the studies conducted by [6], reported higher cocoon weight per mountage was on ribbon chandrike (672.3 g) than regular bamboo mountage (470.5 g), the same was not true in the present study. The reason was probably due to limited exposure period for self mounting for ripened larvae. However, among the self mounting designs of the mounting structures, the spiral mountage (T_1) recorded maximum cocoon weight per mountage among both the breeds, which may even be more when exposed for a longer duration.

3.3 Number of good cocoons per mountage (Number mountage^{-1})

The regular bamboo mountage (T_6) recorded significantly highest number of good cocoons per mountage among both the breeds (637.67 and 473.67 cocoons mountage^{-1} respectively for CB and BV respectively). Among the self mounting structures, the T_1, showed significantly ($P\leq$ 0.01) higher number of good cocoons per mountage followed by T_3 and T_2 while T_5 (Control 1) and T_4 showed significantly ($P\leq$ 0.01) least number of good cocoons for CB (Table 1; Fig. 2). Among the self mounting designs the number of good cocoons per mountage for DH was on par with each other on T_3, T_1 and T_2 which were least among T_4 and T_5. They were too on par with each other (Table 2; Fig. 2).

The two silkworm breeds differed significantly with respect to the number of good cocoons harvested from different mountages. The CB had spun significantly ($P\leq$ 0.01) higher number of good cocoons (341.39 cocoons mountage^{-1}) compared to 258.83 cocoons per mountage in DH. The interaction between the design of the mountage and the silkworm breed also exhibited a strong influence over the number of good cocoons per mountage. Significantly ($P\leq$ 0.01) higher number of good cocoon was recorded for CB on bamboo mountage (637.67 cocoons mountage^{-1}) followed by DH with bamboo mountage (473.67 cocoons mountage^{-1}) that was on par with CB on spiral mountage (459.33 cocoons mountage^{-1}) and the number of good cocoons was least for CB on ribbon chandrike (130.33 cocoons mountage^{-1}) (Table 3). The good cocoon number per mountage was significantly ($P\leq$ 0.01) higher in regular bamboo mountage where the ripened worms were picked manually and mounted to chandrike as per the standard recommendation. Hence, the density was maintained per square feet, which probably might have encouraged the cocoon numbers. But when compared, the per cent good cocoons per mountage did not differ much between the manually mounted and self mounted structures of both breeds. However, comparatively lowest number of good cocoons was recorded on plastic mountage for CB than the DH which could be attributed as the inherent habit of the breed. The observation that the spiral mountage recorded relatively higher per cent good cocoons per mountage indicates the scope for improving among the new mountages for utilization by farmers at a larger scale.

3.4 Weight of good cocoon per mountage (g mountage^{-1})

The cocoons harvested from the treatment T_6 (Control 2) recorded significantly ($P\leq$ 0.01) maximum cocoon weight per mountage followed by T_1, T_3 and T_2 while it was minimum from T_5 (Control 1) and T_4 and both were on par with each other for CB (Table 1; Fig. 3). For the DH, the T_6 (Control 2) recorded maximum cocoon weight per mountage followed by T_3, which was on par with T_2 and T_1 while the cocoons weight was minimum in T_4 and T_5 which were on par with each other (Table 2; Fig. 3).

Similar to number of cocoons per mountage, the cocoons weighed maximum for CB (695.44 g) than the DH (583.61 g). Interaction between different designs of mountages and the silkworm hybrids varied significantly with respect to good cocoon weight per mountage. The CB cocoons harvested from regular bamboo mountage weighed significantly ($P<$ 0.01) maximum (1275.83 g), which was on par with DH on bamboo mountage (1126.50 g). The minimum for CB was found on ribbon chandrike (265.83 g) that weighed on par with H_2xT_5 (Table 3).

The cocoon weight is directly related with the per cent cocooning and the number of good cocoons harvested, which was also true with the present study. Significant ($P\leq$ 0.01) difference was observed with respect to good cocoon number as well as weight per mountage on different designs of the mountages for CB, which is in accordance with the observations of [7, 8], who recorded a marked difference in cocoon weight depending on the mounting structures. Though there was a significant ($P\leq$ 0.01) difference with respect to the good cocoon number and weight per mountage among different mountages, the new self mounting structures performed excellent on par results with each other for DH that could be attributed to the crawling habit of bivoltine silkworms [2]. The earlier studies conducted with regard to mountages have clearly mentioned about the suitability of plastic self mounting structures for bivoltine rearing [3], which is also reflected in the present study.

3.5 Number of defective cocoons per mountage (Number mountage^{-1})

There was significant ($P \leq 0.01$) difference with respect to defective cocoon number per mountage. Higher number of defective cocoons were noticed on T_6 (Control 2) that was on par with T_3 and T_1 whereas lowest was in T_4 in case of CB (Table 1; Fig. 2). The T_6 (Control 2) showed significantly ($P \leq 0.01$) higher number of defective cocoon per mountage^{-1} at DH (Table 2; Fig. 2). Whereas, the minimum number of defective cocoons was observed in T_5, which was on par with T_4, T_1, T_3 and T_2.

When observed individually, the different silkworm breeds as well as their interaction with different designs of the mountages did not vary significantly for the defective cocoon number as well as weight per mountage. However, a significant ($P \leq 0.01$) difference was observed when different mountages were used among the two silkworm hybrids. The interaction effect showed non significant difference with respect to number of defective cocoon per mountage. However, higher defective cocoon number was recorded in DH with bamboo chandrike (66.00) and it was found least in CB with ribbon chandrike (6.00). Significant difference was observed with respect to defective cocoon number per mountage due to use of different mountages. The highest number was found with bamboo mountage (52.92) and was found lowest with ribbon chandrike (9.83) (Table 3).

The defective cocoon number per mountage did not differ significantly as far as different breeds were tested. However, higher defective cocoon number was found with DH (26.11) and lower number was with CB (21.78). The increase or decrease in the number of defective cocoons varies depending on the material and structure of the cocooning frame [10]. The higher number of defective cocoons in T_6 (control 2) with respect to both CB and DH breeds could be due to picking and mounting of both healthy and unhealthy larvae on to T_6 (Control 2) but in case of self-mounting structures (T_1-T_5) probably the healthy worms were self mounted to the respective mountages. Hence the defective cocoons are more in T_6.

3.6 Weight of defective cocoons per mountage (g mountage^{-1})

The defective cocoon weight per mountage was found significantly ($P < 0.05$) maximum in T_6 (Control 2) followed by T_1, T_3, T_5 (Control 1), T_2 and it was least in T_4 for CB (Table 1; Fig. 4). However, in DH T_6 (Control 2) exhibited significantly maximum defective cocoon weight (290.67 g) followed by T_2, T_3, T_1, T_4 and T_5 (Table 2; Fig. 4).

The interaction effect of different mountages and silkworm hybrids showed significant ($P \leq 0.01$) difference with respect to defective cocoon weight per mountage. Significantly maximum defective cocoon weight was recorded in DH with bamboo mountage (290.67 g) followed by DH with square mountage (98.83 g), CB with bamboo mountage (88.33 g) and the minimum was found in CB with ribbon chandrike (13.50 g) (Table 3). The difference in defective cocoon weight was contributed towards more number defective cocoons in respective mountages and also due to different types of defective cocoons with more defective cocoons weight was evident in DH (107.28 g) than CB (53.22). The defective cocoon incidence also varied with silkworm races [11].

Table 1: Influence of different mountages on yield attributes of the cross breed, PM x CSR_2

Particulars	Number of cocoons (No. mountage^{-1})	Cocoon weight (g mountage^{-1})	Good cocoons (No. mountage^{-1})	Weight of good cocoon (g mountage^{-1})	Defective cocoons (No. mountage^{-1})	Weight of defective cocoons (g mountage^{-1})
T_1	486.00	1013.17	459.33 (94.49)	943.00	26.67 (5.51)	70.17
T_2	280.00	586.67	265.33 (94.81)	554.17	14.67 (5.19)	32.50
T_3	391.33	800.00	364.33 (93.10)	739.17	27.00 (6.90)	60.83
T_4	136.33	279.33	130.33 (95.42)	265.83	6.00 (4.58)	13.50
T_5	207.83	448.67	191.33 (91.96)	394.67	16.50 (8.04)	54.00
T_6	677.50	1364.17	637.67 (94.15)	1275.83	39.83 (5.85)	88.33
F-test	**	**	**	**	**	*
SE. m ±	18.19	45.00	17.49	42.56	5.06	13.46
CD	78.59	194.38	75.56	183.85	21.85	41.48

** significant at 1%; * significant at 5%

Figures in the parenthesis indicate percentage values

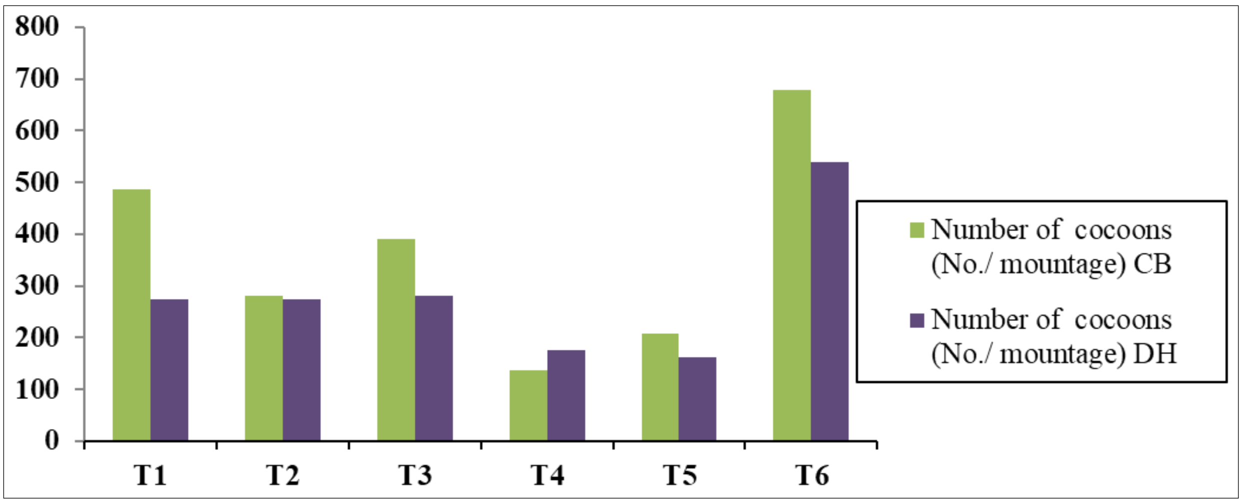

Fig 1: Total number of cocoons among PM x CSR_2 (CB) and Krishnaraja (DH) as influenced by different mountages

Table 2: Influence of different mountages on yield attributes of the Double Hybrid, Krishnaraja

Particulars	Number of cocoons (No. mountage^{-1})	Cocoon weight (g mountage^{-1})	Good cocoons (No. mountage^{-1})	Weight of good cocoon (g mountage^{-1})	Defective cocoons (No. mountage^{-1})	Weight of defective cocoons (g mountage^{-1})
T_1	275.00	602.67	257.00 (93.39)	536.83	18.00 (6.61)	65.83
T_2	275.00	659.00	247.67 (89.97)	560.17	27.33 (10.03)	98.83
T_3	282.00	659.50	262.00 (92.96)	580.83	20.00 (7.04)	78.67
T_4	176.00	419.33	162.33 (91.95)	361.67	13.67 (8.05)	57.67
T_5	162.00	387.67	150.33 (92.84)	335.67	11.67 (7.16)	52.00
T_6	539.67	1417.17	473.67 (87.83)	1126.50	66.00 (12.17)	290.67
F-test	**	**	**	**	**	**
SE. m ±	15.62	38.49	15.61	34.69	6.35	22.04
CD	67.46	166.28	67.44	149.83	27.43	95.22

** significant at 1%

Figures in the parenthesis indicate percentage values

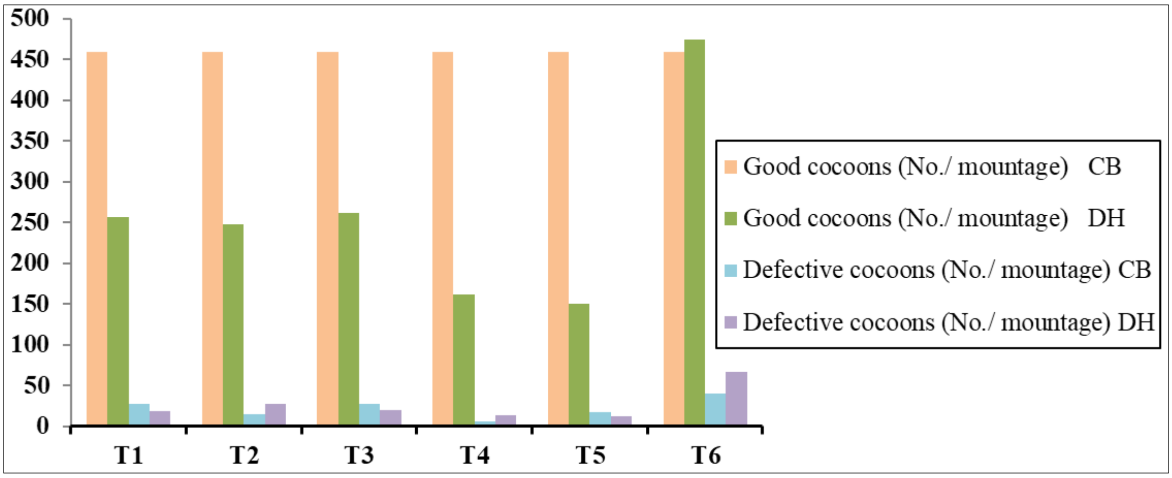

Fig 2: Good and defective cocoon number among PM x CSR_2 (CB) and Krishnaraja (DH) as influenced by different mountages

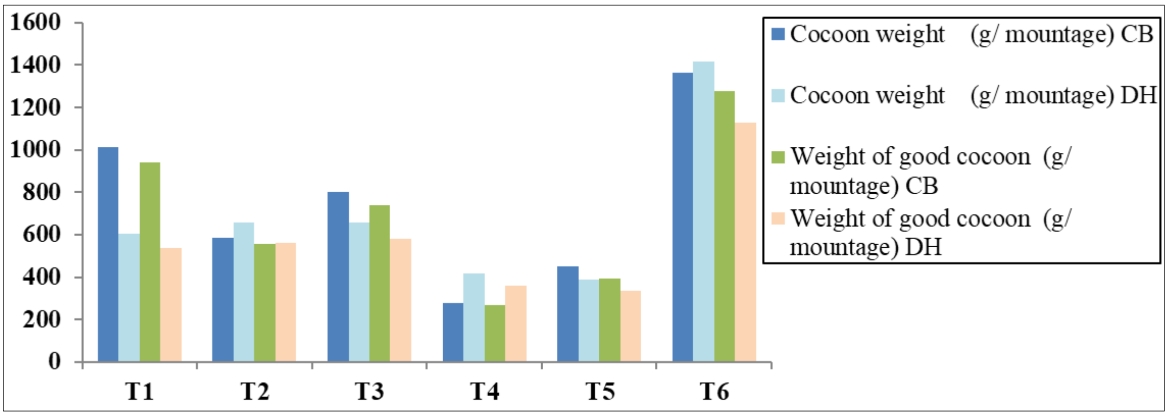

Fig 3: Total cocoon and good cocoon weight among PM x CSR_2 (CB) and Krishnaraja (DH) as influenced by different mountages

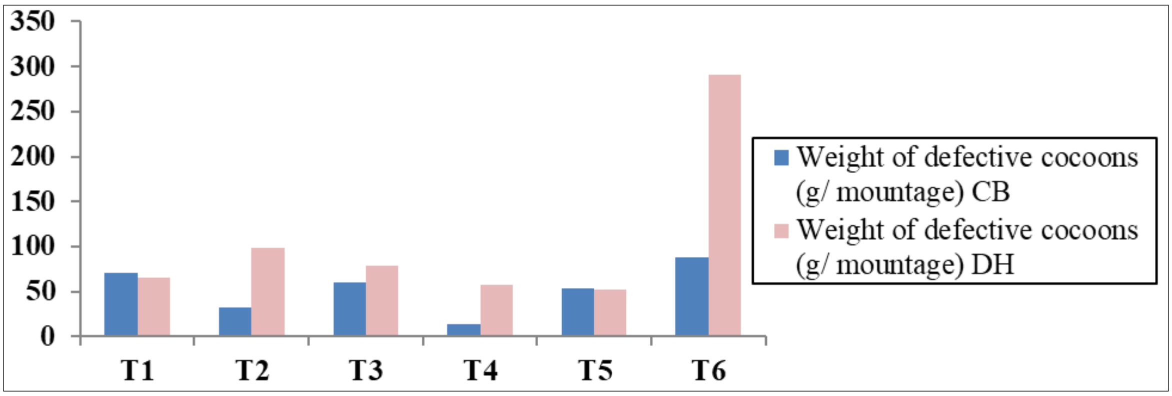

Fig 4: Defective cocoon weight among PM x CSR_2 (CB) and Krishnaraja (DH) as influenced by different mountages

Table 3: Effect of different mountages and silkworm hybrids on cocoon yield parameters

Particulars	Number of cocoons (No./ mountage)	Cocoon weight (g/ mountage)	Good cocoons (No./ mountage)	Weight of good cocoon (g/ mountage)	Defective cocoons (No./ mountage)	Weight of defective cocoons (g/ mountage)
Silkworm hybrids (H)						
H_1 (CB)	363.17	748.67	341.39 (93.99)	695.44	21.78 (6.01)	53.22
H_2 (DH)	284.94	690.89	258.83 (91.49)	583.61	26.11 (8.51)	107.28
F	**	NS	**	**	NS	**
S.Em±	6.92	17.09	6.77	15.85	2.34	7.46
CD @ 1%	27.30	67.42	26.69	62.51	9.24	29.41
Mountages (T)						
T_1	380.50	807.92	358.17 (93.94)	739.92	22.33 (6.06)	68.00
T_2	277.50	622.83	256.50 (92.39)	557.17	21.00 (7.61)	65.67
T_3	336.67	729.75	313.17 (93.03)	660.00	23.50 (6.97)	69.75
T_4	156.17	349.33	146.33 (93.69)	313.75	9.83 (6.31)	35.58
T_5	184.92	418.17	170.83 (92.40)	365.17	14.08 (7.60)	53.00
T_6	608.58	1390.67	555.67 (90.99)	1201.17	52.92 (9.01)	189.50
F	**	**	**	**	**	**
S.Em±	11.99	29.61	11.72	27.45	4.06	12.91
CD @ 1%	47.28	116.77	46.23	108.26	16.01	50.93
Interaction (H x T)						
H_1x T_1	486.00	1013.17	459.33 (94.49)	943.00	26.67 (5.51)	70.17
H_1x T_2	280.00	586.67	265.33 (94.81)	554.17	14.67 (5.19)	32.50
H_1x T_3	391.33	800.00	364.33 (93.10)	739.17	27.00 (6.90)	60.83
H_1x T_4	136.33	279.33	130.33 (95.42)	265.83	6.00 (4.58)	13.50
H_1x T_5	207.83	448.67	191.33 (91.96)	394.67	16.50 (8.04)	54.00
H_1x T_6	677.50	1364.17	637.67 (94.15)	1275.83	39.83 (5.85)	88.33
H_2x T_1	275.00	602.67	257.00 (93.39)	536.83	18.00 (6.61)	65.83
H_2x T_2	275.00	659.00	247.67 (89.97)	560.17	27.33 (10.03)	98.83
H_2x T_3	282.00	659.50	262.00 (92.96)	580.83	20.00 (7.04)	78.67
H_2x T_4	176.00	419.33	162.33 (91.95)	361.67	13.67 (8.05)	57.67
H_2x T_5	162.00	387.67	150.33 (92.84)	335.67	11.67 (7.16)	52.00
H_2x T_6	539.67	1417.17	473.67 (87.83)	1126.50	66.00 (12.17)	290.67
F	**	**	**	**	NS	**
S.Em±	16.95	41.87	16.58	38.82	5.74	18.26
CD @ 1%	66.86	165.13	65.38	153.11	22.64	72.03

** significant at 1%; NS- Non significant
Figures in the parenthesis indicate percentage values

3.7 Relationship between cocoon yield parameters for CB

Total number of cocoons per mountage for CB correlated positively and highly significantly with total cocoon weight per mountage (r=0.9994**), number of good cocoons per mountage (r=0.9998**), weight of good cocoon (r=0.9994**), number of defective cocoon (r=0.9683**) and significantly with weight of defective cocoon (r=0.9005*) (Table 4). Whereas, the total cocoon weight per mountage correlated positively and highly significantly with number of good cocoons per mountage (r=0.9992**), weight of good cocoon per mountage (r=0.9995**), number of defective cocoon (r=0.9683**) and significantly with weight of defective cocoon (r=0.9077*). The number of good cocoons per mountage correlated positively and highly significantly with weight of good cocoon per mountage (r=0.9996**), number of defective cocoon (r=0.9642**) and significantly with weight of defective cocoon (r=0.8948*). The weight of good cocoon per mountage correlated positively and highly significantly with number of defective cocoon (r=0.9620**) and significantly with weight of defective cocoon (r=0.8946*). The number of defective cocoons per mountage correlated positively and highly significantly with weight of defective cocoon (r=0.9604*) (Table 4).

3.8 Relationship between cocoon yield parameters for bivoltine DH

In double hybrid Krishnaraja, the total number of cocoons per mountage correlated positively and highly significantly with total cocoon weight per mountage (r=0.9951**), number of good cocoons per mountage (r=0.9991**), weight of good cocoon (r=0.9989**), number of defective cocoon (r=0.9716**) and weight of defective cocoon (r=0.9595**). The total cocoon weight per mountage correlated positively and highly significantly with number of good cocoons per mountage (r=0.9905**), weight of good cocoon per mountage (r=0.9982**), number of defective cocoon (r=0.9882**) and weight of defective cocoon (r=0.9820**). The number of good cocoons per mountage correlated positively and highly significantly with weight of good cocoon per mountage (r=0.9967**), number of defective cocoon (r=0.9610**) and weight of defective cocoon (r=0.9476**). The weight of good cocoon per mountage correlated positively and highly significantly with number of defective cocoon (r=0.9784**) and weight of defective cocoon (r=0.9689**). The number of defective cocoons per mountage correlated positively and highly significantly with weight of defective cocoon (r=0.9956**) (Table 5). The above results indicated that, number and weight of different cocoons has direct relation with each other in case of CB. Whereas in double hybrid all the parameters investigated are related highly significantly to each other.

Table 4: Relationship between cocoon yield parameters for the cross breed, PM x CSR_2

Particulars	X_1	X_2	X_3	X_4	X_5	X_6
Number of cocoons (X_1)	1.0000					
Cocoon weight (X_2)	0.9994**	1.0000				
Good cocoons (X_3)	0.9998**	0.9992**	1.0000			
Weight of good cocoon (X_4)	0.9994**	0.9995**	0.9996**	1.0000		
Defective cocoons (X_5)	0.9683**	0.9683**	0.9642**	0.9620**	1.0000	
Weight of defective cocoons (X_6)	0.9005*	0.9077*	0.8948*	0.8946*	0.9604**	1.0000

Significant at $P \leq 0.05$; ** Significant at $P \leq 0.01$

Table 5: Relationship between cocoon yield parameters for the Double Hybrid, Krishnaraja

Particulars	X_1	X_2	X_3	X_4	X_5	X_6
Number of cocoons (X_1)	1.0000					
Cocoon weight (X_2)	0.9951**	1.0000				
Good cocoons (X_3)	0.9991**	0.9905**	1.0000			
Weight of good cocoon (X_4)	0.9989**	0.9982**	0.9967**	1.0000		
Defective cocoons (X_5)	0.9716**	0.9882**	0.9610**	0.9784**	1.0000	
Weight of defective cocoons (X_6)	0.9595**	0.9820**	0.9476**	0.9689**	0.9956**	1.0000

** Significant at $P \leq 0.01$

4. Conclusion

The results of the present study reveals that, the new fabricated mountages *viz*., spiral and zig-zag mountages were better when compared to plastic collapsible mountage for various larval and cocoon parameters *viz*., total number of cocoons and their weight per mountage and number and weight of good cocoons per mountage. Similarly, number of defective cocoons per mountage was found least on spiral and zig-zag mountages. Further, mounting of ripened larvae on new self-mountages for longer duration would help to get the results as that of bamboo mountage, because only one and a half hour period of mounting duration was used for the present study. The fabrication and use of new self mounting structures have significant scope in near future, due to the reduction of labour requirement for picking and mounting of the ripened silkworms which ultimately adds to farmers' income.

5. Acknowledgement

The authors would like to thank Department of Sericulture, College of Sericulture, Chintamani, University of Agricultural Sciences, Bangalore – 560 065, for their support to conduct the experiment during the course of the study.

6. References

1. Chandrakanth KS, Srinivasa Babu GK, Dandin SB, Mathur VB, Mahadevamurthy TS. Development of improved mountages. Indian Silk. 2004; 43(5):07-12.
2. Dandin SB, Jayaswal J, Giridhar K. Handbook of Sericulture Technologies. CSB, Bangalore, 2003, 287.
3. Geethadevi RG, Himanthraj MT, Vindhya GS, Mathur VB. Can plastic collapsible mountage replace the bamboo mountage? Indian Silk. 1990; 29(6):26-28.
4. Krishnaswami S, Narasimhanna MN, Suryanarayana SK, Kumararaj S. Manual on Sericulture – 2, Silkworm Rearing; F. A. O., Rome, 1973, 131.
5. Shinde KS, Avhad SB, Jamdar SV, Hiware CJ. Comparative studies on the performance of mountages on cocoon quality of *Bombyx mori* L. Trends in life sciences. 2012; 1:8-11.
6. Shivakumar C, Prasad NR, Katti S, Gupta KNN. Ribbon chandrike - A mechanized cocoon harvester. Indian Silk. 2016; 7(8):141-145.
7. Singh GB, Rajan RK, Inokuchi T, Himantharaj MT, Meenal A, Datta RK. Studies on the use of plastic bottle brush mountages for silkworm mounting and its effect on cocoon characters and reelability. Indian Journal of Sericulture. 1994; 33(1):95-97.
8. Singh GP, Himantharaj MT, Kamble CK, Datta RK. Impact of different mountages on cocoon and reeling parameters in silkworm, *Bombyx mori* L. Sericologia. 1998; 38(2):327-329.
9. Sundar Raj N, Nagaraju S, Venkataramu MN, Jagannath MK. Design and analysis of Field Experiments. Directorate of Research, UAS, Bangalore, 1972, 139.
10. Tazima Y. Handbook of silkworm rearing. Translated by Central Silk Board, Bombay, 1972, 307.
11. Yokoyama T. Synthesised Sciences of Sericulture. Central Silk Board, Bombay, India, 1962, 322-345.