Evaluations of Different Montage Types and Sizes on Eri and Mulberry Feeding Silkworms Cocoon Yield and Quality of Silk, at Melkassa Agricultural Research Center, East Shoa, Ethiopia

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Evaluations of Different Montage Types and Sizes on Eri and Mulberry silkworm cocoon yield and quality of silk. In the mountage type evaluation, 4cm x4cm recommended montage size was prepared from ply wood, cartoon and plastic board. Different montage sizes were prepared from plywood purchased from the market. Hundred silkworm larvae's were used for each montage type and sizes, and the treatments were arranged in randomized block design with three replications. Daily relative humidity and temperatures of the laboratory were taken during the experiment. Cocooning percentage, defective cocoon percentage, reeling/spinning quality, average filament length and silk ratios were used to evaluate the montage types. Similarly, number of double pupae formation per cocoon, average weight of 10 cocoons five days after 4th instars, defective cocoon percentage, spinning reeling quality, length of single cocoon and silk ratios were used to evaluate the montage sizes. Significantly ($P<0.01$) higher cocooning percentage, lower defective cocoon percentage, higher spinning quality, higher filament length and silk ratios were recorded in plywood made, cartoon made and banana leaf made montage than the other treatments followed by mango leaf made montage for both Eri and mulberry silkworms. Number of double pupae formation per cocoon significantly lower in all sizes of the montages except 5 cm x 5 cm montage size for Eri silkworms. However, number of double pupae formation per cocoon significantly $P<0.01$ higher in 5cm x 5cm followed by 3cm x 5cm, 4cm x5cm montage sizes than the other treatments for Mulberry silkworms. From this studies it can conclude that, plywood made, carton made and banana leaf made montage followed by mango leaf montage types should be recommended for eni and mulberry silk worms. It can also conclude that, 4cm x 4cm and 4cm x 5cm montage size made from ply wood should be recommended for mulberry and Eri- silkworms, respectively, and used by the end users.

INTRODUCTION

Mounting is the last stage of rearing operation. Transferring mature fifth instar larvae to montages is called mounting. When larvae are fully mature, they become translucent, their body shrinks, and they stop feeding and start searching for suitable place to attach themselves for cocoon spinning and pupation. These movements clearly indicate to transfer the mature larvae into the montages.

They are picked up and put on montages. The worms attach themselves to the spirals of the montages and start spinning the cocoon. By continuous movement of head, silk fluid is released in minute quantity which hardens to form a long continuous filament. The silkworm at first lays the foundation for the cocoon structure by weaving a preliminary web providing the necessary foot hold for the larva to spin the compact shell of cocoon. Owing to characteristic movements of the head, the silk filament is deposited in a series of short waves forming the figure of eight. This way layers are built and added to form the compact cocoon shell. After the compact shell of the cocoon is formed, the shrinking larva wraps itself and detaches from the shell and becomes pupa or chrysalis. The spinning completes within 2-3 days in multi-voltine varieties and 3-4 days in uni- and bivoltine.

Mountages types which are having proper sizes play a vital role in quality cocoon production. Farmers depend on resources and use different types of materials available locally for making Mountages. Types of material used, finishing of Mountages, space available for spinning worms in Montages etc., will decide the quality of cocoon. Narrow space affects ventilation and results in
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poor reliability of cocoons. Similarly more space results in wastage of silk in the form of floss (Mathur et al., 2010).

Different types of mountages are used in different parts of silk producing areas of the world. In addition to support the spinning worms, the mountages should satisfy the requirements like, it provide convenient space of suitable dimension for spinning good sized cocoons, should not promote formation of double cocoons, malformed cocoons and flimsy cocoons, should have provisions for drying up of the last excreta of the worm prior to spinning and prevention of its falling on the cocoons of other worms, should be suitable for easy mounting and harvesting.

The material and structure of mountages significantly affect the quality of cocoon filament and also the labor required for mounting and harvesting the cocoons. The basic concept of proper mountages types and sizes are to provide an angular uniform space for silk worm to facilitate easy cocoon formation. The fabrication and type of mountages depends on the availability of chief materials in the respective places. If the material and structure of mountages are not proper, it will affect the shape and size of cocoons, besides increasing of double, deformed, soiled cocoons and wastages of silk in the form of floss. The common mountages used at present in India and China are made out of bamboo, plastic material, wood, etc. However, the works on mountage types and size are scanty in Ethiopia. Therefore, it is very crucial to evaluate different types of mountages types and size for better cocoon yield and silk quality for our case.

MATERIALS AND METHODS

Description of Study Area

The experiments were conducted at Melkassa Agricultural research center, for two years (2012 and 2013 G.C.). The place lies at 8°24'N latitude and 39°21'E longitude, 17 km south of Adama, Nazareth, at an altitude of 1550 m.a.s.l. The area is characterized by warm and semi-humid climate. The annual average rainfall and relative humidity of the laboratory during 2012 and 2013 G.C. cropping seasons are 810.1mm, 924.7mm and 59rh, respectively. The average minimum and maximum atmospheric temperatures of the laboratory during 2012 and 2013 G.C. cropping seasons are 9.3, 13.2 and 28.9, 29.1, respectively.

Experimental Design and Methods

The experiment was conducted for two years, i.e. during the 2012, 2013G.C. cropping seasons. Six different mountage types (ply wood, cartoon made, Banana leaf made, plastic, rolling paper and mango leaf montages) and six different montage sizes (3x3, 3 x4, 3 x5, 4 x4, 4 x5 and 5 x5cm) were evaluated. The experiment was laid out in complete randomized design with four replications during 2012 and 2013 seasons experiment. For the montage type activity, ply wood, cartoon and plastic made mountage were purchased from the market and montages were made in the center. Banana and mango branch with leaf were collected from Horticultural Research Center of Melkassa Agricultural Research Center and dried under shade and used as montage for the silkworm. Regarding the montage size experiment, ply wood was purchased from the market and montages were prepared which are having different sizes. Cocooning percentage, defective cocoon percentage, reliability, average filament length and silk ratios were used to evaluate the montage types.

RESULTS AND DISCUSSION

The effects of different mountage types on silkworm cocooning percentage, defective cocoon percentage, spinning quality, filament length and silk ratios of Eri-3.4 are indicated in Table 1 and Table 2. Significantly (P<0.01) higher cocooning percentage, lower defective cocoon percentage, higher spinning quality and higher filament length were recorded in plywood, carton made and banana leaf made mountage followed by mango leaf made mountage (Table 1 and Table 2). Even though lower cocooning percentage and higher defective cocoon percentage were observed in plastic made mountage, significantly higher spinning quality, higher average filament length and silk ratios were observed (Table 1).

On the other hands, silk ratios for all the treatments were in the acceptable ranges for both Eri-India and Eri-3.4 silkworms, except for rolling paper treatment of Eri-3.4 silkworms (Table 1). Significantly higher cocooning percentage, reeling quality and lower defective cocoon percentage were observed in plywood, carton made and banana leaf made mountage followed by the other mountage types for both Korean and Kenian silkworms and non significant differences were recorded among the treatments with in the column (Table 4). An average filament length and silk ratios were significantly higher in all the montage types and insignificant differences were observed among them with in the column for both Korean and Kenian bivoltine (Table 3 and Table4). Similarly, cocooning percentage significantly higher in cartoon and banana leaf made mountage followed by ply wood mountage for mulberry multivoltine silkworms (Table 5). Defective cocoon percentages significantly higher in plastic made mountage followed by rolling paper mountage but significantly lower in the other treatments. An average filament length significantly (P<0.01) higher in the plywood, cartoon, banana leaf and plastic made montages than the other treatments and non significant differences were observed among them. But, significant differences were recorded among the treatments with respect to the silk ratios; however, all the values recorded were in the acceptable ranges for mulberry multivoltine silkworms (Table 5).

The effects of different mountage sizes of plywood on the number of pupae/cocoon/plot, weight of cocoon, defective cocoon percentage, spinning quality, length of single cocoon and silk ratios of Eri- 3.4 and Eri India Cocoons are indicated in Table 6 and Table 7. Significant differences were observed among the treatments within the column for all parameters. Number of double pupae/cocoon/plot significantly lower in all sizes of the montages, except for 5 cm x 5 cm montage size. An average weight of 10 cocoons and length of single cocoon significantly lower in the 3cm x3cm and 4cm x3cm but significantly higher in the other treatments and non significant differences were observed among them within the column. On the other hands, insignificant and similar results were observed among the treatments within the column for defective cocoon percentages, spinning quality and silk ratios of different montage sizes (Table 6). On the other hands, number of double pupae/cocoon/plot significantly (P<0.01) higher in 5cm x5cm followed by...
However, significantly lower numbers of double pupae/cocoons/plot formation were appeared in the other mountage sizes. Similarly, insignificant and higher average weight of 10 cocoons were observed among the mountage sizes. Defective cocoon percentage and length of spinning thread significantly higher in 3cm 5cm, 4cm x 5cm and 5cm x 5cm mountage sizes than the other treatments. Nevertheless, the reeling quality and the silk ratios were significantly higher in 3cm x 3cm, 3cm x 4cm and 4cm x 4 cm mountage sizes and non significant differences were recorded among them within their columns (Table 7).

### Table 1: The effects of different mountage types on silkworm cocooning percentage, defective cocoon percentage, spinning quality filament length and silk ratios of Eri-3.4 silkworms

| No. | Treatments               | Cocooning percentage (%) | Defective cocoon percentage (%) | Spinning quality (%) | Average filament length of 10 cocoons (m) | Silk ratio (%) |
|-----|--------------------------|---------------------------|---------------------------------|----------------------|------------------------------------------|---------------|
| 1   | Ply wood made mountage   | 97.20±0.44a               | 0.012±0.01c                     | 96.87±0.62 a         | 8.88±0.32a                               | 11.53±0.22ab  |
| 2   | Carton made mountage     | 95.69±0.56a               | 0.014±0.01c                     | 96.65±1.01a          | 8.36±0.64ab                               | 11.44±0.04b   |
| 3   | Banana leaf made mountage| 96.69±0.22a               | 0.015±0.01c                     | 95.63±0.68a          | 7.86±0.13cb                               | 11.77±0.18a   |
| 4   | Plastic made mountage    | 69.01±0.50c               | 0.459±0.02a                     | 91.74±5.75a          | 8.34±0.16ab                               | 11.42±0.20ab  |
| 5   | Rolling paper mountage   | 70.84±3.76c               | 0.473±0.01a                     | 65.01±4.40b          | 6.63±0.11d                                | 9.74±0.22c    |
| 6   | Mango leaf made mountage | 80.50±5.10b               | 0.050±0.10b                     | 97.46±0.99a          | 6.93±0.09cd                               | 11.41±0.17ab  |
|     | CV%                      | 5.33                      | 9.35                            | 6.26                 | 6.58                                     | 3.08          |

Means followed by the same letter within a column are not significantly different from each other at 1% level of probability (Student-Newman-Keul’s Range Test).

### Table 2: The effects of different mountage types on silk worm cocooning percentage, defective cocoon percentage, spinning quality, filament length and silk ratios of Eri - India mixed silkworms

| No. | Treatments               | Cocooning percentage (%) | Defective cocoon percentage (%) | Spinning quality (%) | Average filament length of 10 cocoons (m) | Silk ratio (%) |
|-----|--------------------------|---------------------------|---------------------------------|----------------------|------------------------------------------|---------------|
| 1   | Ply wood made mountage   | 93.26±0.75a               | 0.088±0.01c                     | 85.78±0.78a          | 8.09±0.13a                               | 12.38±0.08a   |
| 2   | Carton made mountage     | 93.70±0.42a               | 0.105±0.01c                     | 86.83±0.44a          | 8.24±0.22a                               | 12.05±0.18a   |
| 3   | Banana leaf made mountage| 92.11±0.63a               | 0.094±0.01c                     | 86.15±0.11a          | 7.92±0.12ab                               | 11.87±0.39a   |
| 4   | Plastic made mountage    | 67.09±1.30c               | 0.332±0.02b                     | 76.67±2.31b          | 8.19±0.18a                               | 11.83±0.13a   |
| 5   | Rolling paper mountage   | 62.93±1.73d               | 0.447±0.03a                     | 62.91±2.50c          | 7.55±0.29b                               | 11.12±0.34b   |
| 6   | Mango leaf made mountage | 82.59±0.28b               | 0.124±0.02c                     | 88.07±0.13a          | 6.76±0.26c                               | 10.76±0.08b   |
|     | CV%                      | 1.76                      | 13.05                           | 2.69                 | 3.97                                     | 3.28          |

Means followed by the same letter within a column are not significantly different from each other at 1% level of probability (Student-Newman-Keul’s Range Test).

### Table 3: The effects of different mountage types on silkworm cocooning percentage, defective cocoon percentage, reeling quality, filament length and silk ratios of Kenya bivoltine (K1, K3, K4 and K5) silkworms

| No. | Treatments               | Cocooning percentage (%) | Defective cocoon percentage (%) | Reeling quality (%) | Average filament length of 10 cocoons (m) | Silk ratio (%) |
|-----|--------------------------|---------------------------|---------------------------------|---------------------|------------------------------------------|---------------|
| 1   | Ply wood made mountage   | 95.31±1.21 a              | 0.020±0.001c                    | 83.53±1.76ab        | 811.90±12.87 a                          | 21.87±0.49a   |
| 2   | Carton made mountage     | 87.45±5.31a               | 0.025±0.001c                    | 82.31±2.00 ab       | 827.45±20.95a                           | 23.74±0.04a   |
| 3   | Banana leaf made mountage| 87.88±0.92a               | 0.032±0.001c                    | 81.20±1.64ab        | 830.85±45.20a                           | 22.46±1.17a   |
| 4   | Plastic made mountage    | 62.19±3.49b               | 0.131±0.001b                    | 86.76±0.23a         | 797.44±10.39a                           | 21.39±0.41ab  |
| 5   | Rolling paper mountage   | 64.47±5.09b               | 0.351±0.026a                    | 64.63±3.92c         | 851.49±56.00a                           | 19.04±1.14b   |
| 6   | Mango leaf made mountage | 57.83±2.58b               | 0.017±0.001c                    | 79.81±2.45b         | 805.73±15.01a                           | 22.91±0.17a   |
|     | CV%                      | 8.44                      | 19.79                           | 4.67                | 7.36                                     | 6.23          |

Means followed by the same letter within a column are not significantly different from each other at 1% level of probability (Student-Newman-Keul’s Range Test).
Table 4: The effects of different mountage types, on silkworm cocooning percentage, defective cocoon percentage, reeling quality, filament length and silk ratios of Korea- bivoltine silkworms

| No. | Treatments                        | Cocooning percentage (%) | Defective cocoon percentage (%) | Reeling quality (%) | Average filament length of 10 cocoons (M) | Silk ratio (%) |
|-----|-----------------------------------|---------------------------|---------------------------------|--------------------|------------------------------------------|---------------|
| 1   | Ply wood made mountage             | 75.71±1.18a               | 1.34±0.06b                      | 73.68±2.07ab       | 701.67±23.3a                             | 21.43±0.57b   |
| 2   | carton made mountage               | 74.08±0.57a               | 1.23±0.07b                      | 74.60±0.77a        | 709.00±1.00a                             | 23.15±0.44a   |
| 3   | Banana leaf made mountage          | 71.61±1.08a               | 1.34±0.04b                      | 74.15±0.58a        | 707.44±6.61a                             | 22.21±0.48ab  |
| 4   | Plastic made mountage              | 57.21±4.02c               | 2.59±0.25a                      | 65.28±5.89bc       | 575.81±17.01b                            | 22.91±0.36ab  |
| 5   | Rolling paper mountage             | 74.71±0.35a               | 2.58±0.26a                      | 59.72±2.86c        | 574.34±20.57b                            | 23.80±0.16a   |
| 6   | Mango leaf made mountage           | 65.46±1.39b               | 1.31±0.10b                      | 75.05±1.01a        | 707.89±2.08a                             | 22.33±0.16ab  |

CV% 4.74 15.02 6.68 3.14 4.00

Means followed by the same letter within a column are not significantly different from each other at 1% level of probability (Student-Newman-Keul’s Range Test).

Table 5: The effects of different mountage types on silkworm cocooning percentage, defective cocoon percentage, reeling quality, filament length and silk ratios of Multivoltine silkworm

| No. | Treatments                        | Cocooning percentage (%) | Defective cocoon percentage (%) | Reeling quality (%) | Average filament length of 10 cocoons (m) | Silk ratio (%) |
|-----|-----------------------------------|---------------------------|---------------------------------|--------------------|------------------------------------------|---------------|
| 1   | Ply wood made mountage             | 89.81±0.75 b              | 0.128±0.005d                    | 83.91±1.52a        | 825.57±31.35abc                          | 21.61±0.32c   |
| 2   | Carton made mountage               | 91.21±0.14ab              | 0.190±0.007c                    | 84.13±1.52a        | 877.17±4.34a                            | 23.28±0.28a   |
| 3   | Banana leaf made mountage          | 93.51±1.50a               | 0.175±0.006c                    | 83.10±1.00a        | 815.02±15.50bc                           | 23.38±0.30a   |
| 4   | Plastic made mountage              | 70.13±0.80d               | 0.423±0.004a                    | 67.84±3.93b        | 834.33±18.18ab                           | 22.46±0.56ab  |
| 5   | Rolling paper mountage             | 62.89±0.92e               | 0.368±0.013b                    | 63.13±2.25b        | 638.04±13.76d                           | 20.62±0.28c   |
| 6   | Mango leaf made mountage           | 73.94±0.58c               | 0.138±0.001d                    | 81.39±1.37a        | 768.33±10.80c                           | 22.59±0.38ab  |

CV% 1.84 5.84 5.24 4.14 3.01

Means followed by the same letter within a column are not significantly different from each other at 1% level of probability (Student-Newman-Keul’s Range Test).

Table 6: Effects of different mountage sizes of plywood on number of cocoon /single space, weight of cocoon, defective cocoon percentage, spinning quality, length of single cocoon and silk ratios of Eri- 3.4 and India silkworm

| No. | Treatments                        | Number of double and above/plot | Average weight of 10 cocoons (g) | Defective cocoon percentage (%) | Spinning quality (%) | Length of a single cocoon (m) | Silk ratio (%) |
|-----|-----------------------------------|---------------------------------|---------------------------------|---------------------------------|--------------------|--------------------------------|---------------|
| 1   | 3 cm x 3 cm                       | 0.00±0.00b                      | 2.46±0.22c                      | 0.00±0.00a                      | 76.53±1.94a        | 5.803±0.52c                     | 11.63±0.33a   |
| 2   | 3 cm x 4 cm                       | 0.00±0.00b                      | 3.30±0.02b                      | 0.00±0.00a                      | 73.58±1.31a        | 7.660±0.11b                     | 11.95±0.12a   |
| 3   | 3 cm x 5 cm                       | 0.00±0.00b                      | 3.92±0.09a                      | 0.00±0.00a                      | 74.01±2.13a        | 8.380±0.14a                     | 12.20±0.49a   |
| 4   | 4 cm x 4 cm                       | 0.00±0.00b                      | 3.79±0.03a                      | 0.00±0.00a                      | 74.74±0.37a        | 8.677±0.08b                     | 12.90±0.95a   |
| 5   | 4 cm x 5 cm                       | 0.00±0.00b                      | 4.07±0.02a                      | 0.00±0.00a                      | 74.43±0.85a        | 8.086±0.04ab                    | 12.23±0.88a   |
| 6   | 5 cm x 5 cm                       | 2.05±0.00a                      | 4.08±0.07a                      | 0.00±0.00a                      | 73.81±1.52a        | 8.106±0.02ab                    | 11.68±0.27a   |

CV% 5.34 5.34 3.74 5.01 7.77

Means followed by the same letter within a column are not significantly different from each other at 1% level of probability (Student-Newman-Keul’s Range Test).

Table 7: Effects of different mountage sizes of plywood on number of cocoon /single space, weight of cocoon, defective cocoon percentage, reeling quality, length of single cocoon and silk ratios of bivoltine and multivoltine silkworms (K1, K3, K4, K5, yellow cocoon, white cocoon and Korea).

| No. | Treatments                        | Number of double and above/plot | Average weight of 10 cocoons (g) | Defective cocoon percentage (%) | Reeling quality (%) | Length of a single cocoon (m) | Silk ratio (%) |
|-----|-----------------------------------|---------------------------------|---------------------------------|---------------------------------|--------------------|--------------------------------|---------------|
| 1   | 3 cm x 3 cm                       | 1.65±0.33d                     | 1.87±0.31a                      | 0.00±0.00b                      | 91.79±1.25a        | 674.33±10.17c                  | 21.26±0.32bc  |
| 2   | 3 cm x 4 cm                       | 2.00±0.00d                     | 2.67±0.17a                      | 0.00±0.00b                      | 94.50±2.12a        | 933.67±25.17b                  | 23.59±0.83a   |
| 3   | 3 cm x 5 cm                       | 14.00±1.52c                    | 2.97±0.05a                      | 0.39±0.01a                      | 67.57±1.21b        | 1002±17.03a                    | 19.13±0.43d   |
| 4   | 4 cm x 4 cm                       | 2.00±0.57d                     | 2.69±0.09a                      | 0.00±0.00b                      | 94.03±0.96a        | 987.67±11.99b                  | 22.65±0.74ab  |
| 5   | 4 cm x 5 cm                       | 23.54±2.60b                    | 3.08±0.06a                      | 0.40±0.03a                      | 64.92±1.80b        | 979±25.69a                     | 19.63±0.42dc  |
| 6   | 5 cm x 5 cm                       | 28.63±1.20a                    | 2.90±0.02a                      | 0.43±0.01a                      | 66.11±3.28b        | 1023±5.89a                     | 18.62±0.49d   |

CV% 21.24 10.30 12.56 3.88 3.91 4.81

Means followed by the same letter within a column are not significantly different from each other at 1% level of probability (Student-Newman-Keul’s Range Test).
Mounting and mountages considerably influences the quality of cocoons. The farmers are said to be losing about 5-8 % of yield due to improper mountages (Chandrananthan et al., 2004). It is evident from the mean data of the experiment that in general, ply wood, cartoon and banana leaf mountages showed a marginal tendency to improve many of the economic character as compared to the plastic and rolling paper montage. The results of the present study correlate with (Chandrananthan et al., 2004) where the author used seven types of mountages: Banana leaf type, mango twigs type, shoot rearing rack rotary type, plastic collapsible, fixed vertical type, bamboo mountages and rotary mountages considering cocooning (%), double cocoon(%), floss(%), defective cocoon (%), single cocoon weight (gm), shell weight (gm), shell ratio (%), and reel ability (%) in which the bamboo mat base easily available, cheap and can last 4-5 years but demerit using lot of space during mounting but both all of these mountages shows some merits as well as demerits during study time and also shows variations in economic parameters of cocoon production and quality in each type of mountages. Datta Biswas et al. (2008) also shows Plastic collapsible montage, plywood montage, mango and banana leaf montage are an alternate to bamboo spiral and others montage in Eastern India for better cocoon yield. Chikkanna et al. (2009) also study qualitative improvement in terms of economic gained by using more than two different types of mountages for silk worm cocoon. He also quote that, types of mountages, sizes and mounting environmental condition play a paramount role in determining the quality of cocoons of silk worm, Bombyx mori. Pandey et al. (2007) indicated that, plywood and cartoon made mountages with 4x5cm for Eri silkworm larvae and 4cm x4cm and 4cm x3cm for mulberry silk worm mounting space sizes in North-western India showed better result during study period. Datta Biswas et al. (2007) also showed comparative study of spinning of silkworm in more than three types of mountages (mango leaf, carton made, rolling paper, plastic montage and banana leaf made montage). The Mango tree twigs and banana leaf mountages are playing important role in saving the cocoon crop and are easily available and easy to use for farmers but it has some major draw backs that during harvesting the dried leaves some times stickup to cocoons and the cost of twigs cannot be calculated. According to Mathur and Quadri, (2010) also estimated that farmers loss about 12-15 % of crop due to defective cocooning which is attributed to inadequate Mountages, poor quality of Mountages, shortage of time, lack of proper mounting space, mounting care and management of environmental conditions. Our studies confirmed that, the percentage of urinated cocoon was more in plastic and rolling paper montage compared to other types of mountages. Pandey et al. (2007) also used banana and mango leaf montage in North-Western India which shows better results in improving cocoon quality during study period.

Thus from the present study, it can be concluded that the montage made from plywood, Mango tree twigs, banana leaf and cartons are directly placed on rearing bed to spin cocoon helping the farmer to save labor and do not have any problems of identifying and picking ripe larvae at newly joined sericulturist. However, this method needs more space but during emergency time when there were no sufficient mountages or no any mountages with poor, newly joined farmers at that time Mango tree twigs and banana leaf mountages play vital role for farmers to save cocoon crop.

**CONCLUSIONS**

Therefore from the present study, it can be concluded that, plywood made, cartoon made and banana leaf made montage followed by mango leaf montage types should be recommended for eri and mulberry silk worms. Regarding the montage sizes, 4cm x 4cm and 4cm x 5cm montage size made from ply wood should be recommended for mulberry and Eri- silkworms, respectively, and used by the end users.

**Conflict of Interest**

Conflict of interest none declared.

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