DEVELOPMENT OF TRANSFORMETION TEXTILE PRODUCTS FROM MULBERRY FIBER

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Abstract: This research was studied the appropriate production methods of technical textile from mulberry fiber, transformation of technical textile from mulberry fiber into lamp products and study the customers' satisfaction in lamp products. This study was carried out by using a randomized completed block design: RCBD for the experiment. After that, the technical textile's properties were tested by the standard methods according to American Society for Testing and Materials (ASTM). The technical textile's characteristics were evaluated by specialists. And the customers' satisfaction in lamp products were studied, questionnaires was used to collect data from the sample group of 400 persons, which were drawn from the population by using random sampling technique. Data were analyzed by using frequency, percentage, standard deviation and One-Way ANOVA. The results were found that; the most appropriate production method was using 5 grams of PVA powder and 20 minutes for beating the mulberry fiber by machine. The characteristics of technical textile were good level according to the community products standard. And most customers were highest satisfied in floor lamp of style 1 that used weaving method. The results of hypothesis testing revealed that different quantity of PVA powder and time of beating the mulberry fiber by machine in production method had different thickness and tear strength at the statistically significant .05 level.

Key words: Mulberry Fiber, Technical Textile and Lamp Product

1. Introduction

Sericulture is household industry that has been made widely in Thailand. Especially in the Northeast of the country that has the highest Sericulture. There are famer about 168,413 households that are made sericulture in Thailand [1]. The mulberry leaves is the main food of silk worms. It is a perennial plant, and has science name is morus alba L., commonly known as mulberry, family name is moraceae and Thai name is mon. The farmer have to begin mulberry cultivation one year before farming silk worms and be sure it have enough food for silk worms. Every year, before the rainy season the farmers have to pruning mulberry tree for new ramification that will be the food of silk worms in next generation [2]. The mulberry tree that the famers have to pruning has between the ages of 6-12 months. It has the fiber in the part of bark, the farmers often used instead of rope. Each times pruning have a lot of mulberry branches was discarded. And now a day it has not been used for the other side. So, it is a waste material.

Figure 1 Mulberry tree

Figure 2 Mulberry bark

From such reasons, adding value of the mulberry branches waste by development into textile product such as technical textile from mulberry fiber for art and artifacts. It is the job creation and increases the incomes for the farmers. And it is an approach to development of new fiber in the textile industry of Thailand.

2. Materials and Methods

The research materials were the 6 to 12 months mulberry bark from Nakhonratchasima Province. The research was undertaken in the following four steps.

2.1 Studying of appropriate production methods of technical textile from mulberry fiber

The experimental plan of this research was experiment design of randomized completed block design: RCBD, the study had 2 factors as follows:

2.1.1 The quantity of PVA powder had 3 level; 1, 3 and 5 grams

2.1.2 The time of fiber beating had 3 level; 10, 20 and 30 minutes

The research had 9 treatments and used 3 repeats per treatment.

2.1.3 Studying the properties of technical textile from mulberry fiber

The study included thickness and Tear strength properties according to standardized tests ASTM D1777 Standard Test Method for Thickness of Textile Materials [3] and ASTM D1424 Standard Test Method for Tearing Strength of Fabrics [4].

2.2 The study of the characteristics of technical textile from mulberry fiber

The technical textile was evaluated by 12 specialists according to the Thai Community Product Standard (TCPS) No. 430/2547

2.3 Studying of the customers' satisfaction in lamp products

The study of customers' satisfaction on lamp products had two steps as follows:

2.3.1 The lamp design had three type; hanging lamp, table lamp and floor lamp. And had three styles; style 1 weaving method, style 2 fretwork method and style 3 weaving and fretwork mixing method.

2.3.2 The customers' satisfaction of the lamp products were used questionnaires to collect data from the sample group of 400 persons, which were drawn from the population by using random sampling technique.
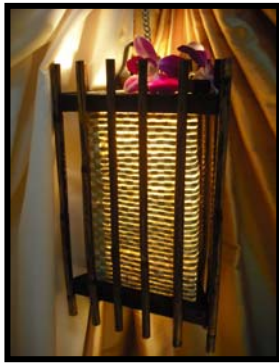
2.4 Analyzing the data

The research data were analyzed by using frequency, percentage, standard deviation and One-Way ANOVA.
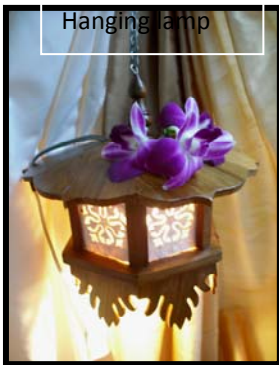
Picture of Lamp Products

Style 1 weaving method

Hanging lamp	Table lamp	Floor lamp

Style 2 fretwork method
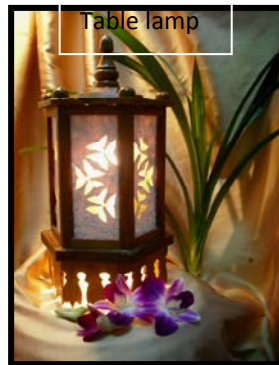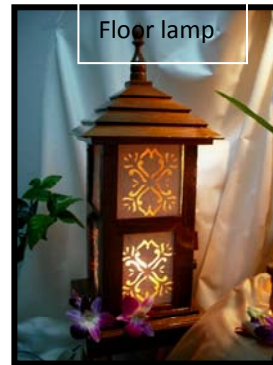
Hanging lamp	Table lamp	Floor lamp

Style 3 weaving and fretwork mixing method

Hanging lamp	Table lamp	Floor lamp

SECTION III

3. Results and Discussion

The research results were presented in three parts as follows:

3.1 The appropriate production methods of technical textile from mulberry

The results were showed that; the technical textile from mulberry fiber formula 7, 4 and 1 had the most thickness, with a maximum thickness in the range looks very similar (0.89, 0.86 and 0.88 mm, respectively). And the tear resistance showed that; the formula 9 had highest mean of tear resistance (454.66 g), followed by formula 8 had the mean of tear resistance 453 grams and formula 7 had the mean of tear resistance 450.33 grams and formula 1had the least mean of tear resistance (280 g). (Table 1)

Table 1 the properties of technical textile from mulberry

Formula	Quantity of PVA powder (gram)	Time of beating (minute)	Thickness (millimeter)		Tearing strength (gram)	
			$\bar{x}$	SD	$\bar{x}$	SD
1	1	10	0.86	.023	280.00	.00
2	1	20	0.80	.011	282.33	.57
3	1	30	0.78	.020	283.00	1.73
4	3	10	0.88	.020	350.66	1.54
5	3	20	0.80	.015	352.66	1.54
6	3	30	0.77	.023	353.33	1.54
7	5	10	0.89	.005	450.33	.57
8	5	20	0.81	.011	453.00	1.73
9	5	30	0.77	.011	454.66	.57

The results of hypothesis testing revealed that**:** the thickness analysis of variance found that; the technical textile from mulberry that had difference PVA powder quantity had not affect to the thickness but the technical textile from mulberry that had difference beating time had different thickness at the statistically significant .05 level. And the tear resistance analysis of variance found that; the technical textile from mulberry that had difference PVA powder quantity and beating time had difference tear resistance at the statistically significant .05 level.

3.2 The characteristics of technical textile from mulberry fiber

The research result found that: the total desired features of technical textile from mulberry including fineness, softness, consistency, texture and color were good level as follows: the fineness of technical textile from all formulas were good level, which the formula 2, 3, 5, 6 and 9 had equal highest level ($\bar{x}$ = 3.25). The softness of technical textile from formula 2 and 3 were very good level, which the formula 3 had softness high level more than formula 2 ($\bar{x}$ = 3.45 and $\bar{x}$ = 3.42). The consistency of technical textile from all formulas were good level, which the formula 2, 3, 4, 6 and 8 had equal highest level ($\bar{x}$ = 3.00). The texture of technical textile from all formulas were good level, which the formula 4 had highest level ($\bar{x}$ = 3.25). The color of technical textile from all formulas were very good level, which the formula 2, 6 and 7 had equal highest level ($\bar{x}$ = 3.47). (Table 2)

Table 2 the characteristics of technical textile from mulberry

Formula	Quantity of PVA powder (gram)	Time of beating (minute)	Fineness	Softness	Consistency	Texture	Color	Total
			$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$	$\bar{x}$
1	1	10	3.00	3.10	2.90	3.20	3.40	**3.1**
2	1	20	3.25	3.42	3.00	3.10	3.47	**3.2**
3	1	30	3.25	3.45	3.00	3.10	3.40	**3.2**
4	3	10	2.90	2.97	3.00	3.25	3.45	**3.1**
5	3	20	3.25	3.00	2.95	3.17	3.40	**3.2**
6	3	30	3.25	3.00	3.00	3.15	3.47	**3.2**
7	5	10	3.07	2.85	2.90	3.17	3.47	**3.1**
8	5	20	3.24	2.90	3.00	3.11	3.40	**3.1**
9	5	30	3.25	2.89	2.90	3.00	3.40	**3.1**

3.3 The customers' satisfaction in lamp products

The research result showed that: most consumers were highest satisfied level in lamp products style 1 that used weaving method ($\bar{x} = 3.50$), followed by the customer had medium satisfied level in style 2 that used fretwork method ($\bar{x} = 2.87$) and style 3 that used mixing weaving and fretwork methods ($\bar{x} = 2.76$), respectively. When classification the customers' satisfaction level of lamp type, the results showed that: the customers were highest satisfied level in floor lamp of style 1. (Figure1).
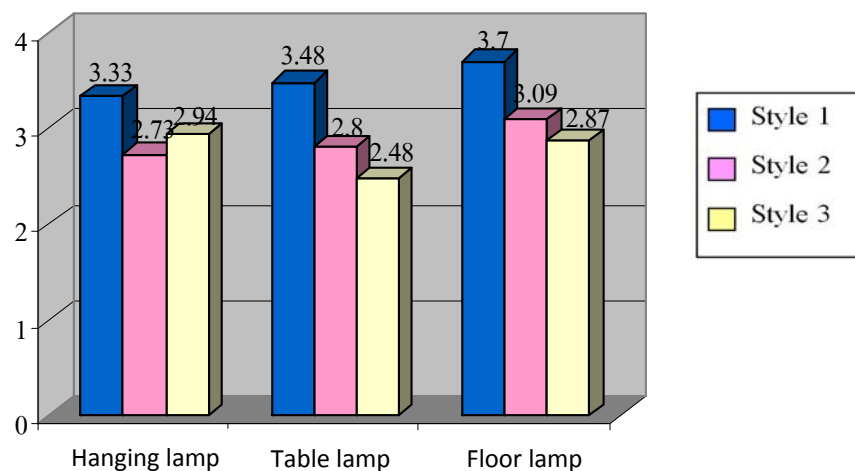

Figure 3 the customers' satisfaction in lamp products

4. Conclusion

The appropriate production methods of technical textile from mulberry for lamp products was formula 8 that used 5 grams of PVA powder and 20 minutes of beating time. The characteristics of technical textile from mulberry including fineness, softness, consistency, texture and color were good level that were passed the community products standard (มผช.๔๓๐/๒๕๔๗). And most customers were highest satisfied in floor lamp of style 1 that used weaving method.

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SECTION III