Development of Thai Style Handmade Paper from Sugar Cane Leaves for Handicraft and Package

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Abstract

The objectives of this work are to develop the technique of making paper from sugar cane leaves, to make the prototype products made from the developed paper, and then transfer the technology to the selected groups. The study included 5 steps: (1) select the target group of 60 people from sugar cane farmers, community enterprise group, and general public in Lopburi province, (2) make the prototype products and present to public, (3) prepare the tools for transferring the technology, (4) transfer the developed technology, and (5) evaluation and statistical analysis including frequency, percentage, mean, and standard deviation.

The general information of the 60 trained people can be summarized as follows: 80.00 % is female, 26.67 % is 31-40 years old, and 40.00 % is sugar cane farmer. The objectives, content, activities, and training method were evaluated to be the best suitable. The structure of the course was found to be the most suitable. More over, the materials, training documents, and place were rated to be the most suitable to the best suitable.

Introduction

Thailand is one of the world leading country of sugar export. There are plenty areas of sugar cane plantation, especially in the central part of the country. After harvesting process, there are a lot of wasted sugar cane leaves left over. Usually, the farmer burns the leaves at the field. This creates a lot of CO_2 emission, which will affect on the global warming. Therefore, this work is proposing a solution to solve this problem by utilizing the wasted sugar cane leaves as a raw material for making paper and then using it to produce handicrafts and packages.

The objectives of this work were to develop the technique to make paper from sugar cane leaves and to make prototype handicraft and packaging products using the obtained paper. Consequently, the developed technique was transferred to the selected groups, especially the sugar cane farmers.

Experimental

The sugar cane leaves were dried and then boiled with sodium hydroxide solution (30 % w/w) at 100 °C, 5 hours. The obtained pulp was then bleached with hydrogen peroxide (8 % w/w), sodium silicate (2 % w/w), magnesium sulphate (0.05 % w/w), and sodium hydroxide (1.5 % w/w) at 100 °C, 2 hours. Next, the bleached pulp was mixed with *Broussonetia papyrifera* pulp (70:30) and dispersed with an aid of U-ramin PN-S (0.05 % w/w) as disperser. The formed sheet was 72 x 84 cm. having a density of 90 ± 5 g/m^2. After drying, it was coated with konjac solution (0.5 % w/w) and then dried again. The physical properties of the paper were tested following standard methods. The designed art works were printed on the paper. Subsequently, the selected prototype products were made.

The training course was designed including techniques for making paper from sugar cane leaves and selected paper products. The target groups of 60 people totally were small and micro community enterprise and farmers in Taluang Distric, Lopburi Province. The training was conducted at T. N. Sugar Plant (Wangkanai Group) Lopburi for 3 days (6 hours per day).

Results and Discussion

The obtained yield of pulp from sugar cane leaves was 45.40 % of dried leaves. After bleaching, the pulp had the brightness close to that of unbleached *Broussonetia papyrifera* pulp. The fold strength, tensile strength, tearing strength, smoothness, bursting strength, and brightness of formed paper were 109.66 times, 20.88 N.m/g, 31.38 mN.m^2/g, 0.93 seconds, 1.74 kPa.m^2/g, and 58.23 %, respectively.

In addition, it was found that the paper could adsorb the printing ink very well during the printing process. Three products: baskets, lampshade, and drawer set were chosen to be developed as prototypes using the obtained paper. The pictures of finished products are shown in Fig. 1-3.

Figure 1 Baskets

Figure 2 Lampshade

Figure 3 Drawer set

Finally, the developed technology was digested into simple training materials starting from the paper making to how to make the finishing products. Then, it was transferred to the target group that are 60 people selected from the small and micro community enterprise and farmers in Taluang Distric, Lopburi Province. Most of them are female (80 %), 31-40 year old (26.7 %) and sugar cane farmers (40 %). The training was conducted at T. N. Sugar Plant (Wangkanai Group) Lopburi for 3 days (6 hours per day). The trainees were asked to evaluate the curriculum in all aspects. It can be summarized in Table 1.

Table 1 Evaluation result on the training course

Aspect	Level of Satisfaction
Structure of the curriculum	high
Objectives of the curriculum	highest
Content of the curriculum	highest
Activities	highest
Training method	highest
Training materials	high - highest
Training documents	high - highest
Place	high - highest

In term of criteria of product, which they concern, it was found that the most concern was function following by image of the product. It should be noted that the color and texture of the sugar cane leaf paper are quite unique and make it be suitable for handicraft. However, the product design is also important.

References

BUSSARA SOIRAYA, SOAWALUCK KONGKACHUICHAY, KATETHIP KIR-NGERN, INGKARN SAMERJAI, Development of Thai-Style Handmade Paper Products from the Cores of Pineapple Fruits, Faculty of Home Economics Technology, Rajamangala University of Technology Phra Nakhon (RMUTP) Chotiwet Campus, 2009.

Prachid Tinabutra, Design of Packaging, O S Printing House, Bangkok, 2000.

Montri Yodbangteuy, Product Design, Odeanstore, Bangkok, 1995.

Rungarun Wattanawong, Fundamentals of Paper, Pulp and Paper Laboratory, Research and Development Section III, Division of Research, Department of Science Service, Bangkok, 2002.

Somkid Bangmo, Techniques for Training and Meeting, Vittayapattana, Bangkok, 2002.

Haruetai Sookying, Packaging Industry in Thailand, Reasearch and development Section, The Industry Finance Corporation of Thailand, 1990.