

Properties of Rhizophora Charcoal for Product Design

Tanutpong Phriwanrat

Abstract—This research investigated the properties of Rhizophora charcoal for product design on 3 aspects: electrical conductor, impurity absorption, and fresh fruit shelf life. After the study, the properties of Rhizophora charcoal were applied to produce local product model at Ban Yisarn, Ampawa District, Samudsongkram Province which can add value to the Rhizophora charcoal as one of the OTOP (One-Tambon-One product). The results showed that the Rhizophora charcoal is not an electrical conductor but good liquid impurity absorber and it can extend fresh fruit shelf life.

Keywords—Design, Product design, Properties of Rhizophora, Rhizophora Charcoal.

I. INTRODUCTION

BANYISARN Community, Ampawa District, Samudsongkram Province is located 6 Km. from the Gulf of Thailand. It is the low area and usually flooded with sea water. So, this area is fertile with abundant mangrove forest. People in this area have made charcoal from Rhizophora wood for generations. Every year there is the reforestation of about 100,000 mangrove trees [1].

Special properties of Rhizophora charcoal are on its hardness giving high thermal value with less sparks. It is supposed to be the best household charcoal with high market demand in both Thailand and outside the country [2],[3]. However, nowadays, most people use LPG in their household instead of charcoals. With the lower demand in charcoal, people in Ban Yisarn Community have to quit their career in making charcoal from Rhizophora wood. To support the community career and culture, the researcher tried to find the way to develop new markets for Rhizophora charcoal. This can reserve the way of life of local community, culture, and intelligent wisdom to carry from this generation to next generations.

II. OBJECTIVES

The research on the properties of Rhizophora charcoal for product design aimed at investigating its properties with the following objectives:

1. To investigate the properties on electrical conductor, impurity absorption, and fresh fruit shelf life.
2. To apply its properties for local product design to increase the income of the people in Ban Yisarn Community, Ampawa District, Samudsongkram Province.

Mr. Tanutpong Phriwanrat is with the Suan Sunandha Rajabhat University, Bangkok, Thailand. (Corresponding author phone: +66 2160 1004; fax: +66 2160 1039; e-mail: witthaya.me@ssru.ac.th, mekhum@yahoo.com).

III. METHODOLOGY

This research has been designed as an experimental research to investigate the properties of Rhizophora charcoal for product design with the following research steps.

- Step 1.* Study the information about the charcoal product at Ban Yisarn Community, Ampawa District, Samudsongkram Province. This included the production process of Rhizophora charcoal and its properties.
- Step 2.* Conduct the experiment to test the properties of Rhizophora charcoal on 3 aspects: electrical conductor, impurity absorption, and fresh fruit shelf life.
- Step 3.* Apply suitable properties of Rhizophora charcoal to design product model for the community.

IV. RESULTS

It can be concluded from the experiment to find the properties of Rhizophora charcoal in 3 aspects as follows:

1. To test the electrical conductivity of Rhizophora charcoal, the researcher measured the resistance of Rhizophora charcoal by using electric multi meter suggested by the specialists from MTEC [4]. The result showed that the Rhizophora charcoal is not an electrical conductor.
2. To test the properties on color and impurity absorption, the experiment was conducted by preparing 2 transparent bottles containing with water with impurity. Rhizophora charcoal was put into one bottle and left for 3 days. There was an observe with the record of the change of color in the two bottles everyday as shown in Table I.

TABLE I
THE ABSORPTION OF RHIZOPHORA CHARCOAL IN CONTAMINATED WATER

Day	Bottle with Rhizophora charcoal	Bottle without Rhizophora charcoal
1	Turbidity remained the same	Turbidity remained the same
2	Less turbidity	Turbidity remained the same
3	Water became clearer than the 2 nd day	Turbidity remained the same

It can be seen from Table I that Rhizophora charcoal can absorb color and impurities in the water.

3. To test the properties on extending fresh fruit shelf life, the researcher tested on 3 types of fruit, i.e. banana, persimmon, and star fruit. The test was conducted by weighing the two groups of the experimental fruit for 7 days as shown in the details below.

The 1st Experiment

The 1st box contained 2 bananas and Rhizophora charcoal.

The 2nd box contained 2 persimmons and Rhizophora charcoal

The 3rd box contained 1 star fruit and Rhizophora charcoal

The 2nd Experiment

The 4th box contained 2 bananas

The 5th box contained 2 persimmons

The 6th box contained 1 star fruit

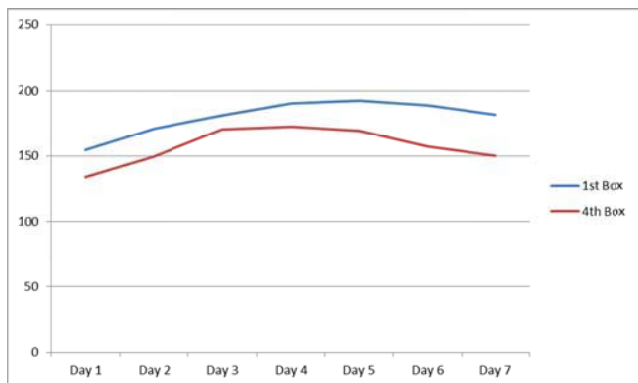


Fig. 1 Property of Rhizophora charcoal in extending fresh fruit shelf life (banana)

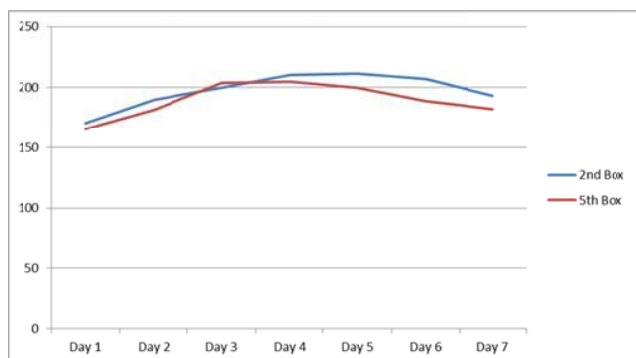


Fig. 2 Property of Rhizophora charcoal in extending fresh fruit shelf life (persimmon)

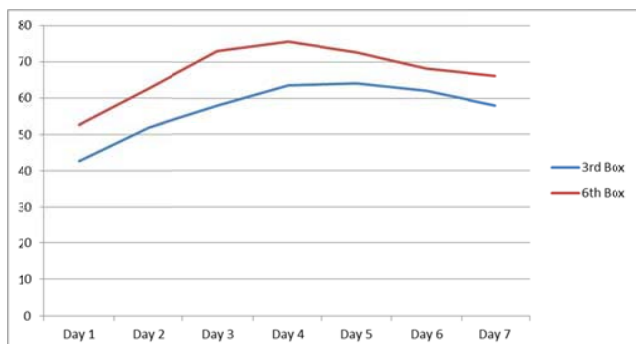


Fig. 3 Property of Rhizophora charcoal in extending fresh fruit shelf life (Star fruit)

It can be seen from the 3 graphs above that at the first duration, the fruit weight increased slightly to a certain time. After that, the fruit weight decreased but at with different rate. It can be observed that fruits in the containers with

Rhizophora charcoal stayed fresh longer than those in the containers without the charcoals.

V. CONCLUSION

From the property test of Rhizophora charcoal, it can be concluded as follows:

1. On the aspect of electrical conductor, Rhizophora charcoal does not have this property.
2. Rhizophora charcoal is good liquid impurity absorber.
3. Rhizophora charcoal can extend fresh fruit shelf life.

After the experiment on properties of Rhizophora charcoal, the researcher washed the outer part of the charcoal, then, let it dry and found that there was no black dust of charcoal any longer. With this property, the researcher tried to design Rhizophora charcoal as a fruit container to keep the fruit shelf life.

The design principle is based on the idea of handicraft design related to local wisdom and the natural value to show the identity of the community. The materials should be available in the area with simple product process [5], [6].



Fig. 4 Computer graphic model of the fruit container



Fig. 5 Details of the fruit container



Fig. 6 Details of the fruit container

VI. SUGGESTIONS

The researcher designed the fruit container for the product prototype for Ban Yisarn Community. The problem found in this study was the shrinkage of Rhizophora charcoal resulting in the change of the designed shape. So, the size of the fruit container before putting in the charcoal kiln should be bigger. There should be a good selection of Rhizophora wood to maintain a good woven pattern and prevent the product from damage.

Because it is a hand-made product, so, the production control is difficult especially on accuracy which is different from manufacturing products. However, each product has its own unity which is the advantage and value of the handicrafts.

One suggestion from this study is on the investigation of shrinkage ratio of Rhizophora wood to find the exact shrinkage percentage for the design of the product.

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