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YARN DEVELOPMENT FROM RICE STRAW TO COMMERCIAL

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Abstract

This research studied the process of separating fibers from rice straw. To study the physical properties of fibers from rice straw and the process of manufacturing yarn from rice straw fibers. It was analyzed by physical textile testing laboratory and developed as woven and into commercial products. The process of separating fibers from dried rice straw and selected the rice straw fiber length at least 30 cm. To subtract and peel off the joints of the lower end by

hand. The result in the physical laboratory, it is cellulose fibers, tensile strength (Newton) at 28.18, elongation (percent) is at 2.01 which is cross-section; oval and clearly and its length is smooth and transparent. There are metals plenty of CADMIUM and LEAD at 0.1 mg/kg, CHROMIUM (TOTAL) / (VI) and COPPER at 0.5 mg/kg. There are 2 warps yarn and using natural color without blench. When woven as a fabric to develop for 4 products prototype: table lamps, tablecloths in Japanese style, potted plants and Accessories Box.

Keywords

Yarn Development, Rice Straw, Commercial

1. Introduction

This race has a big impact: The design avant-garde from more developed countries like Japan, South Korea or Australia has to deal with rising labour costs and shop rents. But it is also finally freeing itself from the fads and dogmas, so that it can now find new inspirations in its own culture. (Daab, 2005). Thailand is one of the few countries in the world that can supply the complete textile industry chain, from upstream, through midstream, to downstream, from petrochemical and natural fiber production, to fabric and textiles, all the way to design, production, and sale of apparel, home textiles, and technical textiles, textiles used primarily for functional purposes by industry. (Bunpord, 2011). No matter in home textile, home decorate and natural products. Current, environmental issues around the world are experiencing an ongoing basis. In particular, Waste is increasing day by day. The cause of residual waste disposal, both types of waste are biodegradable and degradation. Some types can be recycled and can reused to benefit another. As above, almost problems can be found them in industrial sector especially, the textile industry: spinning yarn and fabric production and includes the apparel and every products from any enterprises: industrial enterprises, community enterprises and communities. In order to reduce the amount of textile materials waste from textile manufacturing, which cause pollution, reduce residual waste and also to enhance the knowledge. Moreover, contributed to develop of textile products, both in public sector, private sector and communities groups involved. Researchers realize and recognize alternatives to develop a new special yarn which using textile materials waste to re-produce a new value and to be add-valued. Furthermore, Textile and apparel create fabrics and garments that are both beautiful and functional and also in textile

industrial is profit-driven and therefore must respond to the needs of each customer. (Virginia Hencken Elsasser, 2010) The objectives of the study were as follows.

- To study the sorting process of fibers from rice straw
- To study the physical properties of fibers from rice straw
- To design and produce the rice straw yarn prototype products

2. Methods

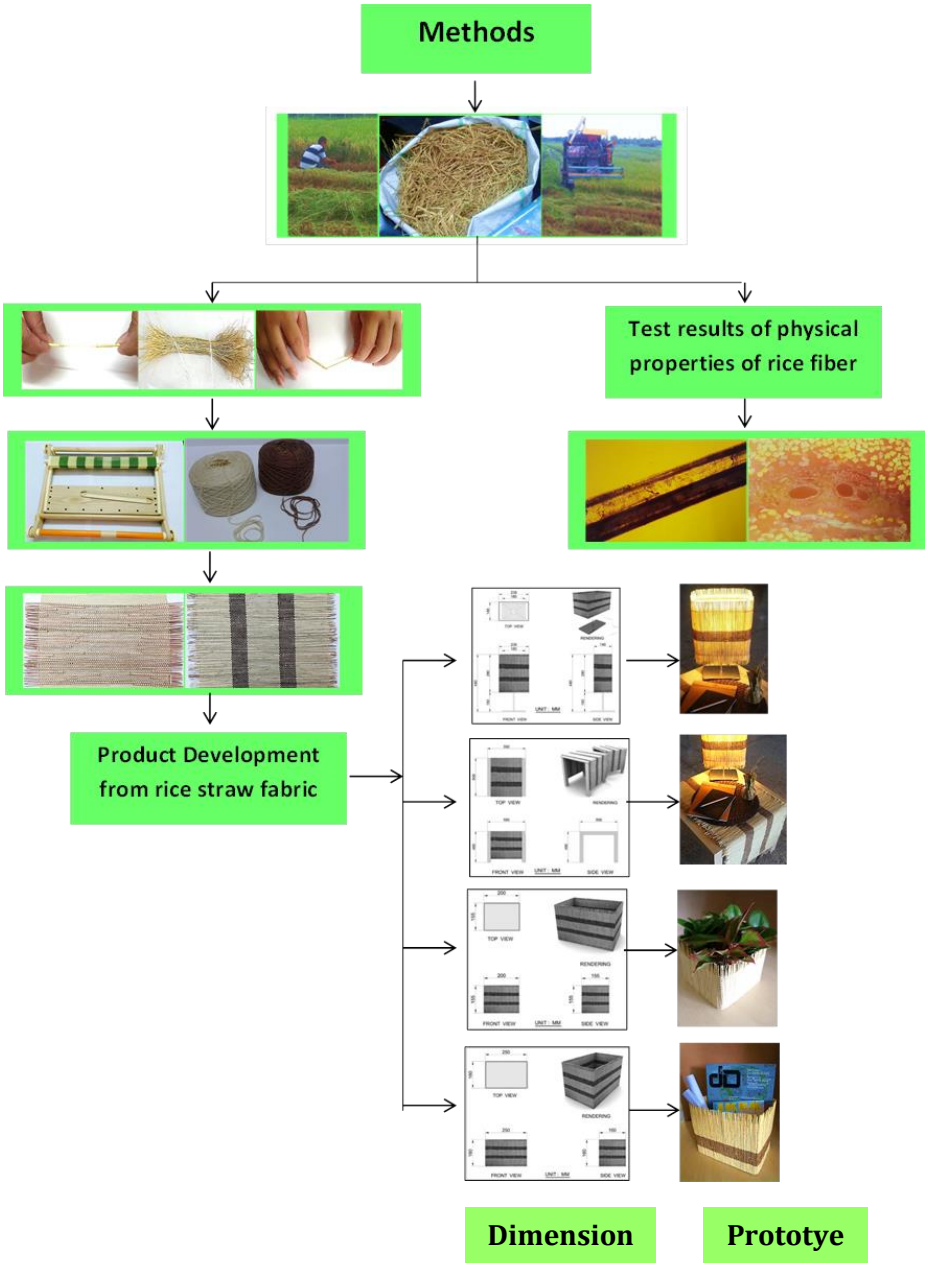


Figure 1: *Diagram of Research Process*

2.1 Study and Find Raw Materials

According to Yhath (2003) said after harvesting grain with a grain truck, the farmer will leave straw and rice stubble that may still be a green color. Laying them down on the floor, the sunlight burn for a few days which was sun sun-dried rice, then the straw and rice to collect the fiber to continue to separate the fiber.

2.2 Physical testing of rice straw's properties

The test was carried out, rice cobs were prepared by equilibrating in a laboratory at 20° C ± 2° C with a tolerance of 65± 2for 8hours (Bussara et al., .(2007) As follow

2.2.1 Cross section and longitudinal section of ASTM D 276: 2000

Bring 1 yarn of rice strew with rayon yarn. Put the yarn through a small hole punched and cut them off the excess of the steel plate both front and rear. Bring the fiber to using the MICROSCOPE LIGHT TESTER (OLYMPUS BX41). The magnification of the microscope is 100 times. Cross Section 200 x Longitudinal Region 40 x and analysis of Heavy Metals

- Fiber strength Tested with a test machine. Tensile Testing Machine (Instron Model 5566) it has a test speed of 300 millimeters per minute. Use a test run of 100 millimeters and a temperature condition. 21 ± 1 ° C and a relative humidity of 65 ± 2%
- Analysis of Heavy Metals by Tester UV-VIS Spectrometer and INDUCTIVELY COUPLED PLASMA-OPTICAL EMISSION Spectrometer to find the amount of heavy metals in the fiber as follow CADMIUM CHROMIUM (TOTAL), (VI) COPPER and LEAD.

2.3 Weaving Process

The machine is table weaving machine, its size is 80x60 cm. square, which made of wood and consisting of plastic seals. It can split the yarn into two sets, width of fabric can be woven up to 60 centimeters. This yarn used in weaving is flat polyester yarns and difference color.

Figure 2: *Table weaving machine and flat polyester yarns*

3. Result

3.1 To study the sorting process of rice stew fiber from rice straw

The natural fibre as vegetable fibres grow as seed hairs, bast(stem), fibres, and leaf and fruits fibres. (P H Greaves and B P Saville,1995) In the experiment, the researcher brought the sun-dried rice straw for 2-3 days. The fiber is sorted by choose the specific fiber that is the stem of the rice and not less than 30 centimeters. Use the handle of the rice straw on the top and bottom of the trunk. Break the joints and pull the shell of the rice straw. Place the strips of peeled rice in a horizontal position; tie them together to prepare for woven into a cloth. The Important thing is should be covered them by wet cloth before weaving.

Figure 3: *Steps of peeling rice straw*

3.2 Test results of physical properties of rice fiber

Study and physical properties of fiber from rice straw which based on the physical results, is CELLULOSIC FIBER (Bussara, 2007) and physical properties of rice straw at the textile testing center, Textile Industry Development Institute, the results are as follows.

3.2.1 Based on the tensile testing

It was found that Fiber strength of the rice straw had the highest tensile strength (Newton) at 28.18 and the elongation at 2.01.

3.2.2 Analysis of heavy metals

It is all heavy metal are not over the standard maximum as follow

CADMIUM found that rice cobs contained a quantity of CADMIUM of 0.1 mg / kg

CHROMIUM (TOTAL), (VI) showed that rice straw contained

CHROMIUM (TOTAL), (VI) at 0.5 mg / kg

COPPER found that rice cassava had a COPPER content of 0.5 mg / kg.

LEAD found that rice cassava had a LEAD content of 0.1 mg / kg

3.2.3 Cross-sectional and longitudinal section area of rice fiber

According to Bussara and Katethip [n.d] explained it is Oval shape, there is a lumen in the center of fiber, can be seen clearly. The longitudinal section has a smooth fiber surface, which is translucent. (Corbman, 1983). It can clearly to see the lumen in the middle of the fiber (Nuankha, 1999) with the following details:

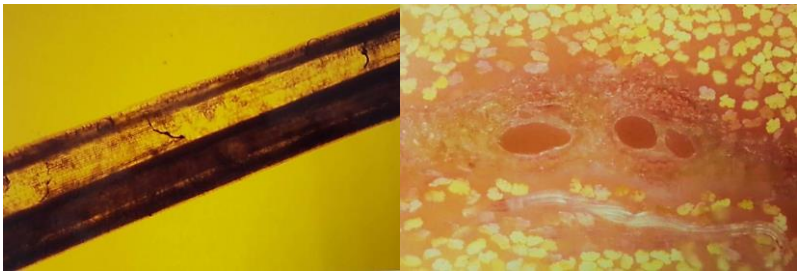
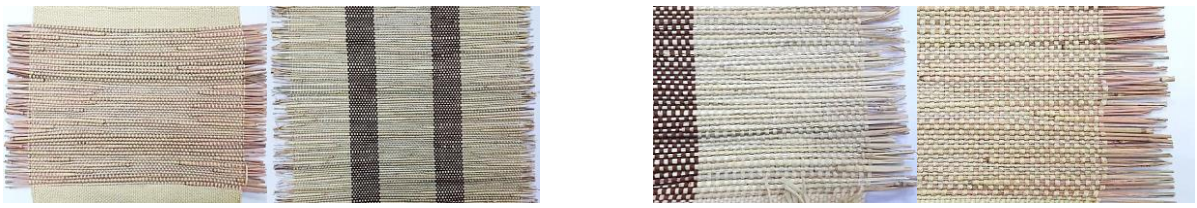


Figure 4: *Cross-sectional area of rice fiber and longitudinal section of rice fiber*

3.3 Weaving cloth from rice straw fiber

- First of all, before weaving, we must prepare the yarn. That suitable for the weaving which is the machine can work quickly and get good quality fabric. (Baby-bride, 2017)
- A Weaving is the simple way to split a thread into two groups, using two yarns, each yarn alternating yarns, one at a time, raising or chopping a single yolk. Open it and to insert into the thread when it hits, will be cut with thread stand as a scene. (Baby-bride, 2017)
- A table weaving machine which makes weaving pattern is basic weaving structure. Warp yarn used as flat poly yarn (Cream and dark brown), the yarn is 2 selected rice straw fibers, namely natural yarn and natural rice staple. The ashes used mordant, that fixing the color, after the dye is found that the color is slightly less sticky. Because of the surface of the rice cob fibers are polished and smooth.



Yarn, rice, natural color Yarn of rice stubble dyed with dried okra

Figure 5: *Woven fabrics using yarn dyed from natural yarn and rice yarn dyed with dried okra*

3.4 Product Development from rice straw fabric

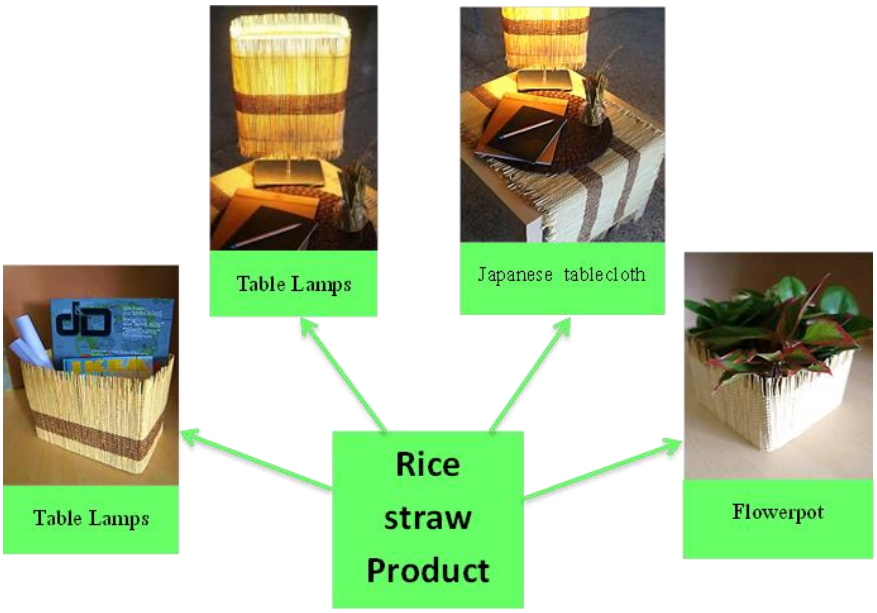


Figure 6: *Prototype product*s

4. Conclusion

- The fiber from the rice straw on the sun dyed for a few days, the fiber is selected from a trunk of not less than 30centimeters long, Place them flat and tied together. Keep it in unpolluted weather to prevent environmental and broken fibers. When we weave the fabric, should be covered wet cloth.
- Test results of physical properties of rice fiber, the result was cellulose fibers. It was 28.18 tensile strength and the elongation was .2.01Based on the heavy metal analysis showed that it contained *chromium (total) (vi), copper and lead*. There are Cross-sectional and longitudinal of fiber from rice straw were oval shape, clearly visible, and the longitudinal section have a smooth, translucent fiber surface. It can clearly see the lumen in the middle of the fiber. The pattern of weaving is a standard weaving, which is the strongest woven structure. (Baby-bride, 2017, May 30). When woven into a cloth, it was made into 4prototype products as table lamps, Japanese tablecloths, flowerpots and multi-purpose boxes.

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