

Sakorn Chonsakorn 2014: Characteristics and Properties of Paper Mulberry Yarn and Fabric. Doctor of Philosophy (Tropical Agriculture), Major Field: Tropical Agriculture, Faculty of Agriculture. Thesis Advisor: Assistant Professor Kajijarus Pirothamsiri, Ph.D. 161 pages.

The objectives of this research were: 1) to determine the characteristics and physical properties of paper mulberry fiber, 2) to develop the spinning methods for paper mulberry yarn, 3) to determine the characteristics and physical properties of the paper mulberry yarns spun by the developed methods and 4) to experimentally produce paper mulberry fabric by weaving and knitting and determine the characteristics and physical properties of the paper mulberry fabrics produced.

The materials used for this study were the inner barks of paper mulberry trees (*Broussonetia papyrifera* (L.) Vent.), between 6 to 12 months old. Two hand spinning methods were developed modifying hemp spinning and cotton spinning methods. The paper mulberry yarns were spun by the modified hemp spinning method using 2, 4 and 6 mm bark strips and the modified cotton spinning method using 3.5, 5 and 6.5 cm fibers. The fiber, the yarns, the woven fabrics and the knitted fabrics produced were tested for physical properties according to American Society of Testing Materials standards (ASTM).

The results were as follows: 1) The fiber was found in clusters with an average diameter of 10 micrometers and had rounded corners with lumen and uneven texture and node. 2) The single fiber was a short fiber while the bundle fiber was an extra long fiber. The single fiber was 0.95 tex whereas the bundle fiber was 13.04 tex. The moisture content of the single fiber was 8.14% and that of the bundle fiber was 10.66%. The tenacity of the single fiber was 4.85 cN/tex and that of the bundle fiber was 15.90 cN/tex. The elongation of the single fiber was 4.50% and that of the bundle fiber was 11.21%. 3) The modified hemp spinning method using 2 mm bark strips produced the longest yarn (978 meters), whereas, the modified hemp spinning method with 6 mm strips produced the highest weight of yarn (975 grams) and the least waste. The modified hemp spinning methods produced much smoother yarns. In contrast, the modified cotton spinning methods produced more fuzzy and rough texture yarns. The yarns spun by different methods statistically had different yarn count, yarn twist, yarn breaking strength and yarn elongation at .01 level. 4) The paper mulberry woven fabrics made from the yarns spun by the modified hemp spinning methods were dense and smooth. In contrast, the paper mulberry woven fabrics made from the yarns spun by the modified cotton spinning methods were fuzzy and thick. The woven fabrics made from the yarns spun by different methods statistically had different thickness, weight, weft count, strength in warp direction, strength in weft direction, elongation in warp direction and elongation in weft direction at .01 level. 5) The paper mulberry knitted fabrics made from the yarns spun by the modified hemp spinning methods were dense and smooth, while, the paper mulberry knitted fabrics made from the yarns spun by the modified cotton spinning methods were rough and fuzzy. The knitted fabrics made from the yarns spun by different methods statistically had different thickness, weight, course count and wale count at .01 level.

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Student's signature

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Thesis Advisor's signature