A Study on Mong Kung Paper Industry in Mong Kung Township

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Abstract

Shan traditional paper is made from paper mulberry Mai-sai-le (called in Shan) plant in Mong Kung Township of Loilen District in Southern Shan State. This Shan traditional paper is famous all over Myanmar as Mong Kung paper. This paper is made from the bark of Mai-sai-le plant as home industry in Southern Shan State. Mai-sai-le plant known as paper mulberry, grows in 28 states in the Northeast, Southeast and Mid-west in the world. The plant used in this research work was collected at the time of flowering and fruiting for plant identification. Fresh specimens were used to study its taxonomy. In this research work, morphological characters of Mai-sai-le plant, paper making process, economic value of the paper within the District and in other Districts, various kinds of using paper and their quantity were studied and described.

Keywords: Mong Kung paper**,** Mai-sai-le plant, paper mulberry

Introduction

Paper plays an essential important role in modern civilized society. Tradionally it has been an indispensable material for the educational and cultural advancement of the people.

Paper is mainly obtained from trees of the several angiosperms families that yield fibres. Fibre yielding plants of Malvaceae, Tiliaceae, Graminae, Musaceae, Bombaceae, Leguminosae, Palmae, Liliaceae, Utricaceae, Amaryllidaceae, Moraceae, Asclepidaceae and Bromeliaceae are important families in paper making.. The main non-wood sources of paper are Gramineae. The fibre from the bark of Moraceae sources are main for paper making.

Bark of paper mulberry is used in making paper, cloth, rope, etc. The fibre is produced by beating strips of bark on a flat surface with a wooden mallet. It is used in the production of flowers, umbrellas, fans, lanterns as well as bags, lamps and toys, cloths and others (Whistler, 2001).

Paper mulberry plant is a small tree or shrub; it is a fast growing tree with often abundant sucker formation. Various leaf forms may occur in the same twig; from ovate with entire margins to lobed on one or both sides. Natural reproduction is produced by seed and root suckers. Paper mulberry tree can regenerate new bark after complete girdling.

Paper mulberry fibres are mainly used in local papermaking usually as home industry in South East Asia. In the Philippines hand-made paper is produced for domestic use as well as for marketing. At the beginning of the 20th century Indonesia indicated that commercial production of the paper based on raw materials from their own country. (Berg, 2003)

Paper-making fibres include wood fibre, bark fibres, bast fibres and textile fibres which are utilized in raw or manufactured state. The bark fibres of paper mulberry are well known as raw material for hand-made paper-making in Myanmar as well as world wide.

Cottage industry of hand made paper were widely famous in Asiantic countries for many Countries. Widely used in various ways such as recording, making folding books, manuscripts to send from one to another kings, as well as in writtern text of Lead Buddha. In

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Janpan they were producing used the head made paper in producing New Year cards, Letters, ever as a paper in cleaning their words by Samurai (Boer, 1998).

Shan paper (ဖိုဲးကိုဲ) made from the bark of Mai-sai-le plant is the product of home industry in Southern Shan State. The bark of this plant is very fibrous and can be easily peeled off from the trunk or stem. The inner bark is more fibrous than the outer one. The bark fibres are soft, lustrous and very strong. These fibres are prepared by sctaping, soaking and beating in order to create paper cloth and ropes of various kind.

Materials and Methods

Mai-sai-le plant was collected from Mong Kung and Panglong Township. The study of plant was carried out systematically in the Department of Botany, with the help of reference literature of Hooker (1879), Hundely and Chit Ko Ko (1967) and Nyo Maung (2002).

The plant is collected from their natural habitat and it was pressed in the woodern press with newspapers, dried corrugated and then sun-dried. When the specimens were dried, it was mounted on the Herbarium sheets according to the method of Nyo Maung (1997).

Papermaking processes are decortications, scotching, retting, mechanical pulping, boiling, sutching and drying (Aung paper production, Pintaya Township).

Results

Morphological characters of *Brossonetia papyrifera* (L.) Vent.

Tree, shrubs, climbers, or herbaceous. Latex present, generally milky. Leaves pinnate, palmate, incised, or simple, stipulate. Inflorescences axillary, typically paired, unisexual or bisexual, monoecious or dioecious, paniculate, racemose, spicate, capitate, or urceolate. Flowers small, unisexual, apetalous; tepals 8-0, generally 4, free or gamophyllous, imbricate or valvate, persistent; stamens isomerous and antitepalous, or reduced to 3, 2, or 1; filaments straight, free or connate, or inflexed; anthers large, mucronate, to small, bilobate and non-mucronate, varying crescentic to turbinate; pistillode present in male flower or not; ovary 1, rarely 2, locular, superior to inferior or immersed in sockets in the inflorescence-axis; styles 2 or 1 with two stigmatic arms, or one stigmatic apical or subapical. Fruits drupaceous, discrete or more or less connate in branous or disintegrated. Embryo various, curved or straight; radicle long, or short, incumbent; cotyledons plicate, conduplicate, or plane, foliaceous or thickened, equal to very unequal. Lamina with or without cystoliths.

Scientific Name	- ***Brossonetia papyrifera*** (L.) Vent.
Vernacular Name	- Paper mulberry (English), Momee (Thailand), Rong (Cambodia), Po sa (Japan), Tha-le, Ma laing; Mai-tun-sao (Myanmar); Mai-sa; Mai sai le (Shan).
Synonyms Name	- *Morus papyrifera* L.(1753)
Family	- Moraceae
Flowering Time	- May – July
Part Used	- Inner bark
Size	- Small tree up to 40ft in height.

Uses and Products

The most significant part of the paper mulberry, its strong fibrous bark is used in making rough paper and tapa cloth.

The sweetish fruits are edible (Hawaii). In Indonesia, the steamed young leaves are eaten. In Hawaii, the slimy sap was used as a laxative and the ash of burnt tapa was used for treating thrush. In Samoa. an infusion of the crushed leaves was used for treating stomach pains. In China, the leaves are fed to pigs. In Myanmar, the bark fibers are used in making paper.

Paper Making Process

The bark was peeled from the cut stem to obtain a single long strip. The inner bark was then separated from the outer bark and after being scraped and washed, the strips were pounded to flatten. Then they are tied up in a bundle of fifty which is about 5 viss of bast. The bark fibers are put into the oil drum layer by layer. The receptacle for boiling was the half cut oil drum. At the bottom of the drum, a layer of bark was placed. On each layer of the bark, kitchen ash was sprinkled and boiled for 6-8 hours. Two tins (10 viss) of ash were needed for a total of 5 viss of bark.

Fibers were separated by boiling in a strong ash solution and beating with the mallet. The resulting pulp was mixed with water and then put into bucket and stirred by churning with bamboo spindle tipped with cross piece. Using bamboo spindle is better than other woody materials.

The pulp solution was scooped up enough for each paper mold. The bucket containing meshed fibre was poured into cloth tray sieve mold bounded by bamboo frame in clean water. The cloth trays with fibre suspension in water were shaken so that the fibre was spread out evenly. Hand spreading fibres have to be resorted to get a uniform thickness of paper. Then the cloth tray was lifted up, water drains away and a sheet of paper was left in the tray. The tray was then left to dry in hot sun for about 3-hours. Before drying enough, the rough sheet was smoothened by rubbing with a procelian cup. Once dried, the sheet of paper was peeled off from the tray.For a sheet of packing paper, about 2 diameter of pulverized bast was used. Tin = 10 viss oil tin used as measure of volume

Paper Outcome

1 viss of fibers can yield good quality paper from 30 to 35 sheets. Market price of paper mulberry bark 3000 Kyats per viss

Cost for paper making (2016-17)

- For 5 viss of bark (1 viss = K 3000) = 15000
- Cost for fuel wood = 5000
- Cost for wood ash (2 bucket) = 1000
- Daily labour (13500 x 3) = 10500

Total Cost 31500

From 5 viss of bark, about 200 sheets of paper can be produced and by selling them at an average rate of 500 kyats per sheet, the income will be K 100000. So the approximate profit margin would be K 68500 for each performance.

Discussion and conclusion

The general distribution of the Mai-sai-le plant extends all along the Western Pacific Island in the Malaya Peninsular, Japan, Nepal, Sri Lanka, Thialand, etc. In Myanmar, it is grown widely in Kayin State, Kayah State, Shan State and Southern Wa Region. Towards the south it grown in Pyin-Oo-Lwin Township and Bhamo in Kachin State. The distribution is therefore widespread in Myanmar.

Maim-Kain paper (Shan paper) industry is important in the rural economy of the Shan State. The genus *Broussonettia* contains 4 species and one variety, mainly distributed in East Asia and the Pacific Islands. Although 4 species occur in China, only one species is found in Myanmar.

The phloem fibre of *Broussonettia paperifera* is case in papermaking. The fruits, root and bark have numerous medicinal uses. Natural fabrics are often made from tree basts that are extracted from the bark in layers or sheets and pounded into rough cloth. Probably the best known of these rough cloth is "tapa cloth", obtained from the bark of paper mulberry (Eric, 2004).

The fibre length is the most important single feature of paper making fibres in determining the properties of paper, especially in strength. The research shows that the outer bark fibres are 12000 µm long and the inner bark fibres have a length of 9500 µm. The fibre cells of outer bark are longer than the inner bark fibre. This also shows that the outer bark is stronger than the inner bark (Berg, 2003).

The paper's flexibility and resistance to rupture depends the ratio of length to width. This ratio defines the fibres whether these are sutible to use in cloth or paper making. In this research, the ratio of length to width of the outer bark and inner bark fibres has 560 µm x 490 µm. Thus, the fibres of inner bark are denser than those of the outer bark. The general procedure in the manufacture of Main- Kaim paper is to peel the bark stripped off the stem and to remove the outer bark. Mai- sai- le stem are cut when they have a diameter of 3-5 cm because older trees have a harder and more brittle bark (Pandey, 2009)

In Main- Kaim, 2 year old trees are (6-10ft) 2-3m tall. The stem is diameter of 0.8 inches it yields about 300 g of fresh bark per tree, equivalent to 90 g dry bark. In Japan, stems from coppiced paper mulberry are usually harvested every 3-5 years (Yuki Ho, 2001). In Indonesia 2 years old plants are harvested (Berg, 2003).The hand-made paper processes of local people are environmentally friendly method in Southern Shan State. The pulping method can be divided into 3 main processes; chemical, mechanical and semi-chemical. In Southern Shan State, the mechanical pulping processes are cased in paper making industry. The mechanical pulping processes are cheaper than chemical processes and it has higher yields and less pollution.

The paper is a rough type mainly used for packaging. It is commonly used as packing paper for silver and lacquer wares and for packing green tea leaves in the Shan State and some other uses. In the Shan State, the paper is dressed in oil and is used in umbrella making. It is also made into the headgear worn by farmers during the planting season of rain and Shan bags.

The Shan paper is not widely used in quantity in the country, its cultural and traditional usefulness makes the industry important for the local economy.

Paper production is a well established cottage industry nowhere practiced except in the Shan State. The paper making methods are largely forgotten by most of the Shan State local people because the process is very laborious.

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Habit

Male Inflorescence

Female Inflorescence

Paper Making Process

A . Stripping the bark off the stem

B. Bundle of bast fibre

C. Beating boiled bast fibre and ash to pulp

D. Stirring the mixture of pulp and water with mill-wheel

E. Pouring the pulp liquid into the frame for making paper

Paper Making Process


F. Pouring the pulp liquid into the frame for making paper



G. Sticking the flowers on the pulp liquid to glorify

H. Lifting paper frame out of tank

I. Drying the glorified pulp



J. Detaching the paper from the frame

K. Shan paper being ready to be used

L. Bamboo frame for making

Paper Making Process


Umbrella


Fan


Lantern Small bags

Myanmar brolly manufacturing industry which uses handicrafts (umbrella, fan, lantern, small bags) made with glorified Shan paper