PLANT FIBRES (JUTE AND OTHERS) OF THAILAND. *

Illustrated by lantern slides, specimens of Jute and other fibre plants.

By

NAI ARIYANT MANJIKUL, B. AG. BOMBAY.**

I am no authority on plant-fibres as such; but whatever I may have to say to-night, is a result of observations made in this country and elsewhere, reinforced with the information already in print, and my personal experience in the processing of fibre, namely jute, in Thailand.

Before beginning with the description of the fibres of this country, a word or two concerning the history of plant fibres in general may be of interest.

HISTORICAL DATA.

Plant fibres have been known to mankind from time immemorial; but when and how they were put to domestic use cannot be said. It is believed by many that the plant fibres were first made use of as fishing-nets. And in prehistoric time, before the art of weaving had come into general use, fabrics for clothing were also made on similar principles as fishing-nets.

Flax is claimed to be the oldest of textile fibres, and its cultivation goes back to the Stone-Age in Europe. Egyptians are said to have made use of this fibre for religious garments and ropes, which served as tackle for hoisting heavy stones in the construction of the wellknown Pyramids. Egyptian fabrics of linen over four thousand years old have been preserved in museums. Hemp (*Cannabis sativa*) was discovered much later, and used for coarser and heavier fabrics as well as for cordage. This particular plant is also the source of the wellknown narcotics such as Bhang and Ganja, known as khancha in Thailand.

Cotton, the most important of plant fibres of to-day, is mentioned in works written more than 800 years B. C.; but we may be sure that it was cultivated and used for textile purposes long before that time. While it is believed by some that cotton first came into prominence in India, its cultivation and utilization were indeed not

---

*Lecture delivered at the Thailand Research Society, June 21, 1940.

**Department of Agriculture and Fisheries.

confined to that country. However, the famous muslin cloth woven in North India was known for its fineness and quality long before the European textile mills came into existence.

In the Orient a plant ordinarily known as remie (*Boehmeria nivea*) has been grown from time immemorial and was used in Egypt just as was flax over three thousand years ago. This plant is also known as China-grass, for the Chinese prepare from it a special kind of fabric known as grass-cloth.

From time to time other fibre plants became commercially important, while jute came into prominence only little over a century ago.

As in most tropical countries, in Thailand there are numerous species of plants which yield substantial quantities of fibre, ranging from small shrubs to big trees. It would be beyond the scope of this paper to name them all. However, there are a few plants cultivated in this country which deserve consideration.

Cotton.

Cotton has been cultivated in Thailand from olden times. It is believed to have been brought either from India or China. In small clearings in the forest where the soils are suitable, cotton is grown very generally for home use in Northern and North-eastern Thailand, From time to time in recent decades there have been introductions of American type cottons, such as from Cambodia, which now are more or less degenerated. One of the principal localities where these cottons are grown is in the Menam Yom Valley at Sukhothai. Such cotton as is not used locally is sold to the middlemen who send it to Bangkok for export. The brown or khaki cotton which is a native of the Indo-China Peninsula and Eastern-India, is also cultivated in North Thailand.

Recently the Government took serious steps with a view to develop the cotton industry in Thailand. Cambodia cotton which has been introduced into various changwads, has many good points, but has also certain drawbacks, namely that it cannot stand the many kinds of cotton pests which are found in Thailand. Experience in many parts of the world has demonstrated all too clearly the unfortunate fact that Cambodia cotton is everywhere unusually susceptible

to a kind of weevil borer and other serious pests. A few years of trial has indicated that this cotton thrives well in drier regions such as in Changwads Luai, Tak, and Kanchanaburi. It prefers a well drained light alluvial soil. In quality, it is distinctly superior to the local cotton. On an average it yields about 100 kgs of seed cotton per rai. With better cultivation, the yield of 250 kilograms per rai have been obtained, whereas the yield of local cotton is on an average 60 kilograms per rai. The ginning percentage too of Cambodia cotton is 35, while that of local variety is 27.

The Government experimental station at Sukhothai is conducting various experiments with Cambodia as well as other new varieties of cotton from foreign countries. It is hoped to develop at the Station hybrids with the good yield and better quality of Cambodia, combined with the hardy character of other cottons.

KAPOK.

Kapok is another fibre producing plant, cultivated on quite a large scale in the regions of Banpong and Kanchanaburi. It is however, grown by villagers generally along fences all over the country. Like cotton, this fibre is produced around the seed, but it is useless for textile purposes. It is mainly used for stuffing pillows, cushions, etc. In the occident there is a very great demand for this fibre, Java and Phillippines being the largest suppliers.

Recently a variety of Togo-land Kapok has been introduced from French Indo-China. It is much superior to the local variety in every respect. Trials at Chantaburi and Kanchanaburi have shown that this variety can be grown under the same conditions as the local Kapok. The Togo-land Kapok has bigger fruits than those of the local variety. Fig. 1. They are nearly thrice as big and yield a superior quality of fibre. Moreover while the local Kapok plant grows very high with scanty branches, with the result that great difficulty is experienced in picking the fruits, Togo-land Kapok has many branches spreading sideways. Fig. 2 and 3.

HIBISCUS FIBRES.

'Paw Kaoe' (*Hibiscus cannabinus*), a well known plant of tropical countries, has been long cultivated here. Its cultivation in Thailand is mainly confined to Bhakh Eisan, i. e. the Korat plain. A plot

of *Paw Kaoe* may often be seen growing near a cottage mainly for home use. Immediately after the plants are cut the fibre is extracted by the ordinary green stripping process. In India, however, where this plant is known as Ambadi or Deccan hemp, the fibre is retted in the same way as is jute, i. e. the plants are fermented in water for a few days, with the result that with the exception of the bast fibre all the tissues of the bark are deccomposed, leaving the actual fibre loosely attached to the plant, till it is stripped and washed.

This fibre is superior to jute as far as the strength and lustre are concerned ; but for textile purposes it is found rather stiff. In India a coarse sack cloth is made from it, though the chief use of this fibre is for ropes and cordage. However, since it is less expensive than jute, it is usually mixed with the latter fibre in reasonable amounts in the manufacture of gunny cloth.

Since the plant does not demand nearly as rich or particular a soil as does jute, there appear to be great possibilities of extending the cultivation of Paw Kaoe in Thailand. If the cultivators are trained to prepare retted fibre, it would help the jute industry considerably, in this, that it could be used in combination with jute in the manufacture of gunny cloth.

Two rather common vegetable plants, okra (*Hibiscus esculentus*) (กะเจี๊ยบ) and rozelle (*H. subdariffa*) (มะขี้อมอญ), if retted, yield quite good fibres. From the specimen displayed it will be seen that these fibres could be mixed with jute in the same way as Paw Kaoe.

Crotalaria, Sterculia, Remie and Hemp.

There is another fibre plant, known in this country as ' Paw Thuang' (*Crotalaria juncea*). In India it is known by several names such as false hemp, sun hemp, Travancore flax,, India hemp etc. In ancient times sun hemp was grown in that country for fibre, utilized for coarser fabrics and cordage. There this fibre is always obtained through retting.

In recent years it is grown chiefly as a green manure crop in many tropical countries.

There are a great many other species of plants in Thailand known for their fibre. (A few of these have been brought here for demonstration). Paw Toob (*Sterculia* species) is cultivated in some

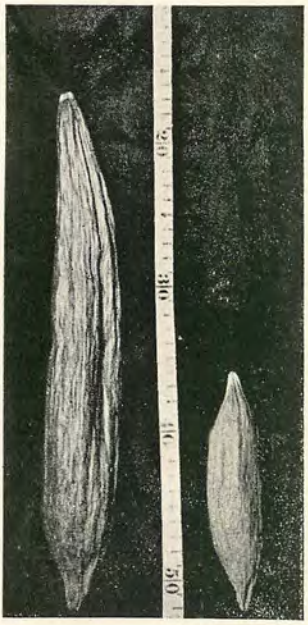

Fig. 1. The Togoland Kapok fruit, compared with the half sized local variety.

Fig. 2. A fourteen month old Togoland Kapok plant at the Pepper Experiment Station, Chantaburi.

Fig. 3. The local Kapok trees, growing on the bank of a river near Ayudhia.

parts of Thailand and the specimen of the retted fibre suggests that this may prove to be a good substitute for jute.

The plant, yielding the strongest fibre namely remie, (*Boehmeria nivea*), is cultivated in China, the Philippines and other tropical countries including India. Here in Thailand it is also grown, but only on a very small scale for fibre and for medicinal use. This fibre, known as *Pan* in Thai, is mainly imported from China for use in the making of fishing nets.

Hemp (*Cannabis sativa*) is cultivated by the mountain tribes, and cloth resembling linen fabric is prepared by them.

JUTE.

As stated above, jute came into prominence only over a century ago when a search was being made for hemp substitutes. However, it was grown by the natives of Bengal long before that period. In China, too, it has been grown for a very long time.

CULTIVATION IN INDIA.

Before machine-made cotton cloth was available in Bengal the natives generally retted, spun and wove jute into fabrics for clothing. With the development of international commerce cotton fabrics became cheap, and at the same time a great demand developed for a strong coarse cloth for making sacks, for shipping grain and other commodities. As a result the natives started wearing cotton clothes. Before the enormous development of machine spinning and weaving of jute, first in Scotland and then in Calcutta, considerable quantities of jute bags were made from hand spun and woven fibre in Bengal. As European machinary began to compete more and more with manual labour, hand-loom gunnies practically disappeared.

It was in those times that so many jute mills sprang up along the banks of the Hugly River in Bengal, and round about Calcutta. Ever since Bengal has had a monopoly of the production of jute, being favoured with suitable soil and climatic conditions for the most successful production of this crop. Labour, also, is very cheep in Bengal. In fact, jute production has developed to such an extent that during the past decade the Bengal government has through extensive propaganda been endeavouring to reduce the production of jute grown in that province.

Numerous attempts have been made in various other tropical countries than India to produce jute fibre for sack making. While soil and climatic condition in a number of places were found fairly favourable, labour was so expensive that it would hardly justify the enterprise.

DOMESTIC CULTIVATION.

Recent investigations indicate that jute (*Paw Krachao*) has been grown in Thailand for a very long time. It is difficult to say how and when jute was first cultivated in our country, but it is very likely that the Chinese introduced it into Thailand. Some Chinese gardeners even now grow it as a vegetable, the leaves being cooked.

The districts near about Ayudhia and Changwad Sukhothai are the only places hitherto known where this crop is cultivated for the production of fibre. The fibre produced in Ayudhia is brought down to Bangkok for sale, whereas that produced at Sukhothai is mainly for local use. The jute product sold in the Bangkok market at present is not in the strictest sense fibre. It is the bark of the jute plant, stripped while green, and then dried. It is used mainly by local merchants for tying small packages ; however, much of it is used in spinning small ropes. The process of retting is not known to the farmers.

HARVESTING.

The local method, stripping, drying and utilizing the dry bark, is as follows :—

When the plants are about to flower they are cut close to the ground and the leafy growth is removed. A few plants are held in hand and placed in a forked wooden device fitted on a heavy block of wood. The plants are then bent in such a way that the bark splits and the broken ends of the stem protrude out through the split bark. Then when the bark is pulled sharply by one hand the woody stem leaves the bark, and goes on out straight. Fig. 4. After the bark and stem, on one side of the break, have been separated, the plant is reversed and the other half similarly separated. The stripped fibre is then taken home and dried in the sun for three to four days, depending on the amount of sunshine. The dried fibre is then tied into bundles weighing about 40 kilograms each.

Fig. 4. Stripping the green jute bark by the local method.

Fig. 5. Twisting the dry strips of jute bark into cords.

Fig. 6. Twisting the cords, shown in Fig. 5, into ropes.

Fig. 9. Bringing up the jute bundles, after being under water for about thirteen days, now ready to be stripped.

Fig. 10. Holding a retted jute stock near the middle in both hands, the brittle core is broken. Taking one half in one hand, the core is pushed out with the thumb of the other and vice versa, so that the fibre alone is left. This is laid across the lap until a handful is ready for rinsing.

Fig. 11. Stripping of jute is best done near where the plants have been retted. Where the water is deep bamboo racks or seats have to be provided for the labourers hand stripping the retted plants.

A few farmers in Ayudhia make rope out of the dry bark. The dry bark is first moistened and twisted into a cord. Fig. 5. Three of these cords or strands are then twisted into a 3 strand rope. Fig. 6.

Very recently since jute has been found to grow fairly well in certain regions, there have been attempts made to find out if the retted jute fibre could be produced in Thailand. Some 30 years ago a foreigner, employed in the Railways and being a former resident of Bengal, experimented with jute in this country. He ordered seeds from India and with the help of a Thai friend got the farmers at Amphur Lam Luka, near about Khlong Rang Sit, to grow the crop in the paddy fields. The fibre was produced and was said to be good. Since the soils of this locality are very heavy and generally unsuitable for jute, it is very doubtful that the growth was really satisfactory.

Before finally getting either local or overseas markets for this fibre the World War (1914) broke out and no further trials were made.

At Amphur Bangpahan, where soil and flood conditions are favourable, jute grows to a height of 3 to 4 meters. Fig. 7. Recent trials showed that the fibre prepared there compared very favourably with that produced in India.

The harvesting was done during the 1st week of October when the plants had started to flower. At this time most of the plots were under flood water, which was gradually rising. In some plots the water was so deep that the harvesting work had to be done by the help of boats. Fig. 8. Cutting the plants was not possible, so they had to be pulled up first, and than the root portion was chopped off.

PREPARATION OF FIBRE.

No difficulty was experienced in retting as there was ample water everywhere. The plants, already tied into bundles, were piled in two or three layers. Java weed was made use of in weighting the plants down so as to keep them well submerged.

After about 13 days the plants were ready to be stripped. Fig. 9. As the whole district was flooded some difficulty was experienced in stripping. Bamboo stands had to be fixed for the labourers to sit and strip the fibre. Figs. 10. and 11.

Conclusions.

As far as soils are concerned it is found that jute grows very well on silt loam, generally found along the river banks, which are inundated with silt laiden water every year. This flooding naturally has great effect on the fertility of the soil.

Relatively very narrow strips of such soils are found all along the banks of the rivers North and North-west of Ayudhia. Further up stream the width of the strips of suitable soils frequently increase. Near about Chainart extensive strips of good soil are found.

While the soils in close proximity of rivers North of Paknampho are suitable, the flood conditions are not so favourable, as the river water there rise very suddenly, when the plants are still young. At Savankhalok this difficulty was experienced during the previous year, with the result that many rais of jute were destroyed.

Fig. 12. Some care is exercised in drying the jute fibre so as to prevent it from becoming entangled.

Fig. 13. The method of tying jute fibre into small bundles before transportation. The rope which goes round the bundle is pulled by one man with a simple device, while the other takes a string made from unretted jute bark and fastens it round the bundle.