

Cont. from last issue

AN AGRO-INDUSTRIAL PLAN FOR THE DEVELOPMENT OF THE KITUL INDUSTRY IN SRI LANKA

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4.5 Kitul Palm Tapping Practices

Tapping usually starts with the second inflorescence (flower) to emerge: this is the first side or lateral flower. A variable number of (commonly 5-7) following flowers are tapped over a period of 3-5 years. But if yield is poor the palm will be abandoned at any time. Steps in the process of preparation or "training" an inflorescence for tapping according to several kitul tappers are as follows:

- i. the sheath is cut away, leaning the immature inflorescence exposed just before the emergence of an inflorescence.
- ii. after a week later a cavity 4" × 1" and 1" deep is chiseled at the side of the lower portion of the spathe, about 4" from axil, and into this is tamped any one of a number of vegetable mixtures. This is to induce sap flow. The hole in the spathe is then sealed and bound up with coir fibre.
(the mixtures are many and tappers treat the spathes with chillies, salt, pomelo, and ash. Some use pepper, garlic, chillie and some acid. The exact ingredients are not known).

- iii. about 3 days after this mix is put in place, 1/3 of the exposed inflorescence is cut off and remaining 2/3 is bound with coir fibre and the spathe is trained to bend down, usually banging a stone from it, then removed, and at the same time fibre twine is tied around the spathe in 2 or 3 bands.
- iv. tapping is commenced by taking a thin slice off the continuity of tapping successive flowers. Some growers claimed that it was beneficial to tap only every alternate flower and to "rest" the palm between tappings. On the other hand, experienced tappers claim that there is no need to do this. They report that a following flower should be trained while the previous spathe was still in production. But this continuity was seldom possible, because flowers emerged irregularly and their emergence seems to be very weather dependent. During the periods of seasonal drought they will not emerge at all, then 2 or 3 flowers may emerge at the end of the drought almost simultaneously.

Some farmers tap one of these, while others prefer to ignore them and wait for the next flower.

In short, there are many tapping practices and training methods. On an average a good palm will be tapped for 5-7 inflorescences of a total of 12-15 which it produces during its life. This will occur (discontinuously) over about 4 years. Then the palm will be abandoned.

4.6 Age at first Tapping

The major disadvantages of kitul are the long time before obtaining the first harvest and its short productive life. The first age for tapping is probably in 10-12 years. This long gestation eliminates kitul as a mono crop under estate conditions.

4.7 Mira Yield per Flower

There is a large degree of variations on the yield of each flower. The production per flower increases from 2-4 bottles per day to a maximum of 2-9 bottled per day at the end of 4 weeks.

4.8 Total Production over Tapping Cycle

Life span extends over 4 years. The production is 2589 bottles of mira per palm. On an average it is about 2000 bottles.

4.9 Average Annual Production per Palm over 0-4 year Production Life

Average annual yield per palm over 4 years	Number of farms surveyed in Kandy-Paradeniya-Kotmale
Below 400 bottles	7
401-800 bottles	7
801-1200 bottles	4
1201-1400 bottles	2
647 bottles	mean

4.10 Yield Variability among Farms

The reasons for yield variations may be ascribed to.

- a. different varieties having different yield potential;
- b. degree of tapping skill probably varies widely;
- c. local climatic conditions, soil and moisture;
- d. data based on farmers memory estimates and are subject to error.

4.11 Products

As a rule of thumb the mira conversion rates for products are:

- 1 bottle of toddy requires..... 1 bottle of mira
- 1 bottle of treacle requires..... 7-8 bottles of mira
- 1 pound of jaggery requires 11-12 bottles of mira.

Profit Cost and Finance Plan	Profit Cost				
<i>Fixed Cost</i>	<i>Rs.</i>				
Land	40,000				
Building	440,000				
Production Equipment	75,000				
Furniture & Fittings	20,000				
Contingencies	9,500				
Vehicles	300,000				
Working Capital	183,645				
	1,068,145				
Financed by:					
Equity	480,000				
Loan	588,145				
	1,068,145				
Cash Flow Statement					
	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5</i>
<i>Fixed Assets</i>	884.5	884.5	884.5	884.5	884.5
<i>Less: Depreciation</i>	33.8	67.7	101.6	135.5	169.3
Sales	850.6	816.7	782.8	749.0	715.1
Working Capital	183.6	183.6	183.6	183.6	183.6
Cash	29.1	82.7	125.3	168.0	210.6
	1,063.4	1,083.1	1,091.9	1,100.6	1,109.3
Equity	1068.1	1,068.1	1,068.1	1,068.1	1,068.1
P/L	-4.6	15.0	23.7	32.5	41.2
	1,063.4	1,083.1	1,091.9	1,100.6	1,109.8

4.12 Kitul Jaggery

This is prepared by heating honey gradually whilst continuously stirring to prevent caramalization. The jaggery is ready when a few drops placed in water harden, rather than dissolve. It is then removed from the fire, to cool slowly, and when crystallization occurs it is poured into blocks/moulds ($\frac{1}{2}$ shell of coconuts). The common requirement are 1.5 bottles of honey per pound of jaggery.

4.13 Kitul Fibre

This is collected from the top 1/3 of the trunk. As new fronds emerge and develop at the top of the palm they are supported (bound) to the trunk by strands of this fibre which has about the colour, strength and gauge of black horse hair, and which grows out of the edges of each sheath. As the palm grows the bottom fronds fall off, freeing the binding fibre which accumulates in loose rolls around the trunk. This is used in the manufacture of heavy dry brushes and ropes. The finer strands deteriorate after 4-6 months of exposure around the trunk and it is doubtful of more than $\frac{1}{2}$ the total fibre periodically collected could survive rotting and cleaning.

About three fronds fall annually. The total fibre yield from each would be about 2-3 ozs. (i.e. 6-9 ozs per palm annually); but it is not harvested regularly. The fibre has been shipped from Sri Lanka to Europe, especially Germany, since 1860 under the name Ceylon piassava or kitul.

Wilfred & Co., Colombo were the main exporters. This Caryota-piassava differs from the true piassava in being finer, darker and more like horse hair. After steeping in lin-seed oil the fibre becomes very pliable and is used for insulating brush manufacture in Europe, India, Indo-China etc. The finer fibre can be spun into fishing-lines, and is used in Indo-China and elsewhere for coarse thread for sewing. Mr. A. Robbottom was the first to introduce kitul fibre to European commerce. (See: Span's Encyclopedia). He reports that the India kitul fibre is inferior to Sri Lankan fibre. The Indian fibre (salapa) is preferred for substituting whale bone in corset making. (See Fibre flow chart.)

Sri Lankan fibre exports have fallen markedly since 1953 from 1300 cwt. to 200 cwt. after 1970. The reasons are:

- Orders are not received for kitul fibre
- Substitution by palmyrah fibre
- Competition from synthetics.

4.14 Kitul Twine

If the long rope like clusters of fruits are allowed to develop to near maturity the long single stems (3-5 feet) provide a strong and tough cord which is used as lashings in the construction of farm buildings and as ties in fencing. No exports are recorded.

The Sri Lanka black kitul fibre from leaf-stalks is manufactured into

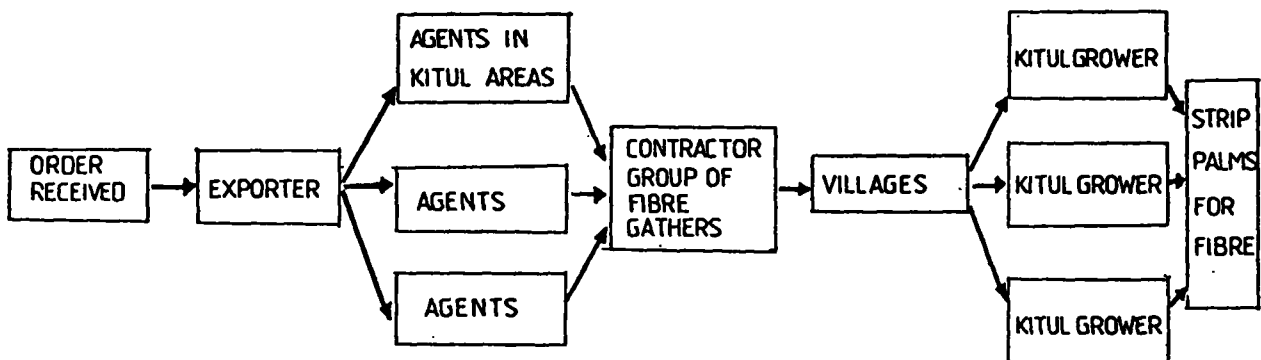
ropes which are of great strength and durability, being used for tying wild elephants. A woolly material found at the base of the leaves is sometimes used for caulking stripe ships in Burma. In some parts of India the cord like fibre from the stem of this and other palms is employed as a bow-string or as a fishing line.

4.15 Kitul Flour

Sago and toddy cannot be got from the same palm, for the palm must be cut down to get the sago, before the time of toddy harvest. Very little sago is made from it, however this sago is quite wholesome. It is prepared in the usual way. In other words, the palm is cut and the pulpy, fibrous material is cut up, washed, soaked in water, strained and sun dried to yield kitul flour from which sago is made. The yield of flour per palm ranges from 2-3 to 20 pounds, the latter yield only rarely. Roughly the yield is 6-7 pound per palm.

In the Philippines *C. Cumingi* Lodd, takes the place of *C. Urens*. It yields fibre. It also gives sago; and toddy or palm wine is also produced. In Java, Borneo, Sumatra and other Indonesian islands, *C. rumphiana*, Mart, takes its place. Sago is only restored to in times of scarcity. The cabbage can be eaten, but is rather bitter and the fibre of the stem is like kitul. Fishing lines are made of fibre in Borneo. It serves as a tinder.

Caryota palms are defended by needle crystals in the tissues. These crystals, in



FIBRE FLOW CHART

contact with the skin and still more if inside the stomach, cause great irritation. It is recorded that the inhabitants of the Mentawis islands use the petioles of one species for arrows.

4.16 Kitul Palm Wood

This is recovered from about the outer 2 inches of the trunk. It is a hard, and durable construction material. From a 30 feet trunk and with a loss of 30% on splitting and milling, the average palm would yield about 50-60 square feet of 2 inch palm planks. Minor amounts are used as wooden components in various ornamental works and for decorative inlay work by village artisans. It has potential to be used as parquet flooring, for furniture, for spinning wheels, standing palm at the end of their useful life are sometimes suitable for timber extraction rather than allow them to decay.

The wood is durable, vascular bundles crowded, black, very large. The wood is strong and durable. It is used for agricultural purposes, water conduits and buckets. It is useful for building purposes.

4.17 Kitul Palm Trunks

Trunks of young palms are succulent elephant food, the palm trunk providing a convenient concentrated form in which the daily rations for a working elephant may be carried.

4.18 Medicine

A glass of the fresh mira taken early in the morning acts as a laxative (Pharm of India). The nut is used as an application to the head in the cases of hermicrania (S. Arjun, Bombay drugs). The root back and cabbage of the palm are used for the treatment of rheumatic swellings and snake bite poisoning. The cabbage is used medicinally for gastric ulcers. The root is used for tooth ailments, the back and seed on boils and the tender flower for promoting growth of hair (Jayaweera, P. 179).

5.0 Place of Kitul in the Economies of Small Farms

Apart from the waste land of the wet mid-zone tea country, and in the village gardens, most kitul is found on small holder mixed farms. Nearly 1/3 of the Kandyan village gardens in Yatinuwara, Udunuwara, Harispattuwa, Dumbara valley, Kotmale, Kegalle, Ruanwella belt and the low country village gardens in Agalawatte, Horana, Bulathsinhala, Elpitiya, Deniyaya, Nakiyadeniya have kitul in their farms.

6.0 Economic returns from Kitul as a Small Holder Crop

In order to work out the economic returns it is necessary to work on the following assumptions:

- a. Palms are planted on a 4 year rota-

tion, at the beginning of year 1, 5, 9 and 13 etc. 20% of the palms are non-productive and as felled are sold as wood one year after tapping. The final density of 60 palms per acre is reached in year 9.

- b. mean mira yield is 650 bottles per palm per year starting in year 13.

- c. By-products are:

- i. fibre yield starting in year 4 and continuing at an average of ½ pound per palm annually.
- ii. un-productive palm and productive palms at the end of their useful lives are felled, split and sold as manufacturing timber.

- d. Prices assumed are:

Mira	15.00 per bottle
Fibre	2.50 per pound
Timber	12.00 per square feet

- e. Costs of this type of enterprise can only be estimated. Total annual cost level of ½ the total gross value of output of all items are assumed.

- f. The assumed density of 60 palms per acre after year 8 would permit under planting of pasture and other crops with kitul and introduction of dairy and goat farming. There are wide range of possibilities not considered here.

The annual net return at current prices and cost would be approx. Rs. 15,000/- after 12 years. Issues regarding supply of tapping labour, jaggery/treacle prices, yields under commercial conditions needs to be studied.

7.0 An Agricultural and Agro-industrial Plan for the Development of Kitul in Sri Lanka

- a. Survey all possible waste land and the population in the wet zone mid country with the assistance of the Land Use Policy Planning diversion of the Ministry of Lands, Irrigation and Mahaveli;
- b. Establish kitul nurseries from selected mother palms in the selected areas for replanting;
- c. Introduce kitul palm to small holders highlands in suitable AGA divisions;
- d. Introduce kitul as a palm for reforestation programme as agro-forestry;
- e. Introduction of pasture and dairy/goat under kitul replanted waste lands;

Guide to Total Production from 1 Acre of Kitul Planted in Year 4 Rotation¹

Year	No. of Palms	Fibre (lbs.)	Total Production	
			Mira (bottles)	Timber(sq. ft.)
1	20	-	-	-
2	20	-	-	-
3	20	-	-	-
4	20	-	-	-
5	40	7	-	-
6	40	7	-	-
7	40	7	-	-
8	40	7	-	-
9	60	14	-	-
10	60	14	-	-
11	60	14	-	-
12	60	14	-	-
13	60	21	10400	200
14	60	17	10400	-
15	60	17	10400	-
16	60	17	10400	800
17	60	11	10400	200
18	60	11	10400	-
19	60	11	10400	-
20	60	11	10400	800

Note (1) 20 palms planted each 4 years, 20% unproductive palms felled 1 year after tapping and each cycle of producing palm felled after 4 years of tapping. Possibility of starch recovery not considered.

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- f. Landless settlers be selected for settlement in these areas once development takes off;
- g. Establish collecting centres for mira in kitul growing areas where treacle/-jaggery centres could be established;
- h. Marketing of kitul products be organized with private sector participation;
- i. Training on kitul agro-industries to be undertaken by the IDB;
- j. R & D on agronomy on kitul to be undertaken by the Coconut research Board, Lunuwila and Industrial aspects by CISIR and IDB;
- k. Appointment of a steering committee to undertake Provincial Planning of the development of the kitul industry with AGA participation.