



FOOD FROM PALMS

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There are many species of palms which not only provide us with food but with other necessities of life too

THOUGH cereal crops, on account of the basic food they produce, are regarded as most useful to man, there are many species of palms which provide us with not only food but with other necessities of life also. Thus, around the tropics, palms are the most useful trees. They are looked upon with reverence and affection by the people who depend on them for their existence and give them such eulogical epithets as 'Trees of Heaven', 'Trees of Life, Abundance and Plenty', 'Man's Greatest Providers in the Tropics' etc.

Coconut, the most important among the palms, is almost everything for the inhabitants of tropical coasts, especially those of the Pacific Islands. As W.V.D. Pieris puts it, "Human life would become intolerable if there were no coconut palms. On the stools it would become impossible. Nothing has been found to take its place and nothing is likely to be found in the foreseeable future".

Brief accounts of the most important species of palms as sources of food are given below :

1. The coconut palm

Although each and every part of the coconut palm (*Cocos nucifera*) is useful to man in one way or other, the following are the important articles of food. The very nutritious, refreshing and satisfying beverage the tender coconut produces is consumed in large quantities in all the coconut producing countries. In India, for instance, over 55 million tender nuts are consumed annually. Of the centres in India, Calcutta and its suburbs enjoy tender nuts most, amounting to about 6 million nuts

per year. A view of one of the numerous tender coconut markets in Calcutta is seen in illustration 1. According to the Ayurvedic system of medicine, the tender nut water possesses therapeutic properties. It has been used for feeding infants suffering from intestinal troubles. Intravenous administration of coconut water has been reported to cure nutritional oedema and severe under-nutrition and cause diuresis. It is a good substitute for glucose-saline infusion (C.B. Sharma, *Science Reporter*, March, 1966). Charles Darwin, after drinking a tender coconut under the shade of a coconut tree in Keeling Island remarked, "Those alone who have tried it, know how delicious it is to be seated in such a shade and drink the cool pleasant fluid of the coconut."

The mature coconut is an important article of food. Raw kernel is consumed alone or with jaggery and/or with beaten rice. It is largely used in curries. In India alone 5,00,000 tonnes of mature coconut kernels are consumed. In addition, some copra is also consumed directly. The milk extracted from fresh, grated coconut



Fig. 1. View of a tender coconut market in Calcutta

is used in several food preparations. Coconut milk is a specific for gastrointestinal disturbances. The total solids in coconut milk are of the following percentage composition:

Fat	.. 7.10%
Carbohydrates (sugars)	.. 1.75%
Protein	.. 0.80%
Minerals	.. 0.55%

Total solids : 10.20%

Desiccated coconut is manufactured from fresh mature nuts after removing the brown testa. The kernel is then washed in fresh water, shredded and dried in hot-air ovens, and the final product is graded before being packed in lead-lined wooden cases. One thousand nuts yield about three hundred and fifty pounds of desiccated coconut. Some of the stages in the manufacture of desiccated coconut are depicted in illustration 2. Desiccated coconut is used in the manufacture of cakes, pastries and chocolates. "Tend-O-nut" is the trade name given to the desiccated coconut subjected to a tenderising and sweetening process. "Tend-O-nut" contains 60 per cent pure coconut, 38 per cent sugar and 2 per cent moisture. This is a delicious centre



Fig. 2. Some stages in the manufacture of desiccated coconut in Ceylon

In sweets and used for sprinkling on or decorating cakes or as cake-filling. It can be eaten without further preparation, softened with a little warm milk, tea or water.

Coconut oil is extracted from copra by either crushing in ghanies, expellers and hydraulic presses or by solvent extraction from the cake. Coconut oil is colourless or light brown and has a characteristic aroma. This oil is one of the leading items in world production and trade in vegetable oils. Its output, estimated for 1960 at 2.2 million tonnes, represents about 15 percent of the total production of all vegetable oils, and gives it the third rank among these oils with respect to production (J. Pyraihon, *Coconut Bull.*, August, 1962). It is estimated that about half the consumption of coconut oil in India is for edible purposes, for which the oil is also refined, deodorised or winterized. The stearin obtained in winterization is known as coconut butter and is used in confectionary. Refined coconut oil by itself and after hydrogenation is used to a

limited extent in the biscuit industry. Coconut oil is digested and absorbed to the extent of 95 to 98 per cent in the system. The consumption of coconut oil in the producing and non-producing countries is given in illustration 3.

The coconut oil-cake is the residue left after extracting the oil from copra. The yield of cake may vary from 33 to 40 per cent of the copra. This is one of the important sources of vegetable proteins containing about 20 per cent of protein. At 10 percent level intake, coconut protein has a biological value of 71 to 77 per cent and a digestibility of 86 to 94 per cent (V. Subrahmanyam and M. Swaminathan, *Coconut Bull.* August, 1959). Coconut protein: have thus a high biological value. They contain many of the amino acids in fair amounts, and perhaps contain all basic amino acid: essential for growth and maintenance. Scientists have shown that coconut oil-cake supplements the rice diet. The oil-cake fed to dairy cows increased the fat-content of

milk, retarded the natural decrease in milk yield due to advancing lactation and produced a hard butter of excellent flavour.

The juice obtained on tapping the inflorescence is rich in sugar and is a delicious and cooling beverage. When the fresh juice is boiled down, brown candy or palm sugar which surpasses cane sugar or beet sugar in many respects is obtained. If the juice is allowed to ferment, toddy from which arrack is distilled, is obtained. Vinegar is also prepared from fermented palm juice. The growing point of the palm, covered by the crown of leaves, is called the cabbage. It is eaten raw like artichoke or pickled. The 'apple' of the germinating nut is a delicacy. Estimates show that 12,192 tonnes of tender coconuts, 4,97,480 tonnes of mature coconuts, 87,376 tonnes of edible copra and 2,17,424 tonnes of coconut oil—all expressed in terms of the kernel—in addition to small amounts of desiccated coconut and appreciable amounts of coconut jaggery are consumed annually in India. The total consumption in different forms amounts to 2,893 million nuts or over 80 percent of the total nuts produced in the country. The reason for such large scale home-consumption of coconuts is no doubt due to its palatability, richness, and easy availability. No wonder the coconut is considered the 'Kalpa Vriksha', the tree that provides all the necessities of man.

2. Sugar palm

The sugar palm (*Arenga pinnata* or *Arenga saccharifera*) is next only to the coconut in its legion of uses. Practically each and every part of the palm is put to one use or another. Unlike the coconut which has the pantropical distribution, the sugar palm is more or less indigenous to the Indo-Malaysian archipelago.

R.H. Miller (*Principes*, October, 1964) mentions the several products

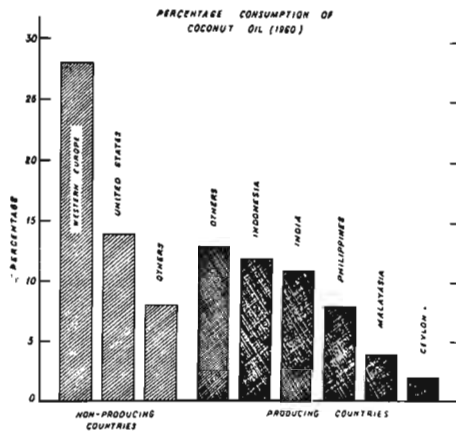


Fig. 3. Consumption of coconut oil in various countries

of this palm used as food. The terminal bud is edible, and highly prized for salads, whether raw or cooked. The very tender etiolated leaves and petioles and the pith of young stems are occasionally eaten in soup or fried. They are said to be relished as a pickled preserved by the Manipuris. The cartilaginous, white, slippery immature endosperm of the sugar palm is used for preparing a favourite confection. In Java and elsewhere, unproductive sugar palms are felled and the pith scooped out to obtain the starchy sago. The best sago is, however, obtained in large quantities when the palm just produces the inflorescences. It is not uncommon for an old sugar palm to yield from 125 to 135 lbs or more of starch in Indonesia, and this yield is considered to be actually about one-fifth of that obtained from the true sago palm, *Metroxylon sago*. The starch obtained from the sugar palm is highly prized by the Filipinos. After the starch has been removed, the remaining fibre and finely chopped particles of the stem are sometimes boiled down into a gruel as feed for swine in the Philippines. The sugar palm is tapped for the juice and the sweet beverage may be drunk in its fresh state or allowed to ferment into a relatively mild wine which is a kind of national drink in Indonesia. In the Philippines it is a highly prized drink whether in the fresh or in the alcoholic state. The fermented beverage may be distilled into a type of brandy or gin much relished by the Chinese and Malays. The fresh sap, when maintained at low alcoholic content, is also used by some Indonesian bakeries in the preparation of yeast. Each litre of fresh sap containing 14 per cent sucrose yields approximately 80 cc of 90 per cent alcohol. Vinegar is also prepared from the fermented sap.

3. The palmyra palm

The palmyra (*Borassus flabellifer*),

also known as Tala, Tal, Tad, though a native of India, grows also in Ceylon, Burma and Pakistan. In India, the states of Madras, Andhra and Kerala are studded with this species and it grows sparsely in Orissa, Bengal, Bihar, Maharashtra, Mysore and Gujarat. The Tamils consider this as the "Kalpa Vriksha" since every part of the palm is turned to account in some way or other. By far the most important aspect of the tree is the food it gives. The sugary sap called toddy is almost as famous for its use as notorious for its abuse. A palmyra palm is either a male or a female (unlike the coconut, which produces both male and female flowers on the same tree), and the young flower-bunches of the male and female trees are tapped for the juice. The toddy procured from the male palmyra is said to be sweeter than that from the female. The palmyra toddy is compared to the best mild-champagne or the American cider or ginger beer. It is interesting that a good deal of the Ceylon ginger beer is made from palmyra toddy.

The sweet toddy is boiled until it becomes a thick syrup and then it is poured into small baskets or cups where it cools and hardens into jaggery. The juice of the palmyra is richer in saccharin matter than that of most other palms. To make the crystallised jaggery, which is extensively used as medicine, the syrup is not boiled for so long a time. The pot which contains it is covered and put aside for some months, at the end of which period, crystals are formed in abundance. The jaggery and the palm sugar are consumed directly as food. Vinegar is also obtained by a fermenting process. If the toddy is distilled, the result is a palm-wine.

Mahatma Gandhi, the Father of the Nation, remarked about palm gur at Brindavan in 1939, "Neera can be converted into jaggery sweet

as honey itself. This jaggery is superior to cane jaggery. Cane jaggery is sweet, but palm jaggery is sweet and delicious. It can be produced worth crores of rupees. Palm gur gives mineral salts too. Doctors have told me to eat jaggery and I always eat palm gur. Nature has made this product in such a way that it cannot be manufactured in the mill; it is produced in the cottages. Where there are palm trees there this jaggery can be easily produced. *Andhra Desha* has thousands of palm trees; there jaggery is produced in every hamlet. This is the way to banish poverty from the land. This also is an antidote to poverty."

The fruit of the palmyra also has many uses. When tender, the fruit is cut at the stalk end to expose the immature seeds containing a jelly like endosperm. A fruit may have usually three seeds, but rarely two, one and even four seeds are possible as seen in illustration 4. The jelly, when tender is sweet by itself, and especially for the summer months it forms a cooling, delicious and filling food. The ripe fruit has a very sweet though fibrous peripheral layer surrounding the seeds. The fruit is roasted in direct fire, the fleshy layer removed and the thick syrupy matter consumed. Also the syrup extracted by hand is mixed with flour and many preparations are made with it. Bengalese seem to be experts at this, and the fruits in Calcutta are almost as costly as coconuts. When the seed germinates, the cotyledon which grows into the cavity of the seed is a delicacy. The first leaf of the palmyra seedling which gets buried in the soil is very fleshy and stores chiefly the carbohydrates. This succulent rudimentary leaf is boiled or roasted and eaten. This highly prized commodity is available only for a couple of weeks in the year. Sometimes they are dried, powdered, and the flour used for making pancakes.

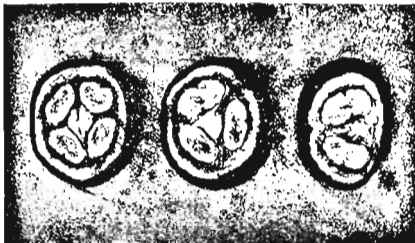


Fig. 4. Two, three and four-seeded palmyra fruits partially cut open to expose the edible endosperm



Fig. 5. A view of the crown of an African oil palm

4. The oil palm

The oil palm (*Elaeis guineensis*), more popularly called the African oil palm, grows sporadically in India, but cultivated on large scale in Malaysia and Indonesia, is a native of West Africa. It is a robust palm, and the male and female flowers are borne on different bunches in the axils of middle-aged leaves of the same palm. Illustration 5 depicts a closer view of a crown showing three

heavy fruit-bearing bunches and a male bunch (m).

The oil palm is foremost among the useful palms of tropical Western Africa. The oil extracted from the mesocarp of ripe fruits of this palm constitutes in most parts the chief food of the local people, who hardly ever take a meal in which it is not used in one way or the other. It is nutritious and forms a favourite dish with even Europeans (E. Blatter,

Palms of British India and Ceylon). Besides being used as food, the local inhabitants also use it for oiling their bodies. The kernel also yields a white fatty oil which is not very popular as food, but largely used in industry.

5. The Fish-tail palm

The fish tail palm (*Caryota urens*) has several names: Indian sago palm, Bastard sago palm, East Indian wine palm, Jaggery palm, Kitul tree, Toddy palm, Hill palm, Mhar palm etc. This palm is quite common in India and grows rather wild in Kerala, Mysore, Maharashtra, Gujarat, Orissa, Bengal and Assam states.

The palm flowers only once in its life and the few flower bunches are produced from the uppermost leaf axils. The trunk is usually split just before flowering, the pithy materials processed and a sago equal to the best commercial sago is obtained. The flour is baked into bread or boiled into a thick gruel. As Roxburgh said, "These form a great part of the diet of (especially the poor) people; and during the famine they suffered little while these trees lasted. I have reason to believe this substance to be highly nutritious, I have eaten the gruel and think it fully as palatable as that made of the sago we get from the Malay countries."

The long, pendulous inflorescences yield abundant sweet juice which is a delicious beverage. The sugary juice is either fermented and distilled into an alcoholic liquor, or boiled down into a dark syrup which solidifies into palm sugar or jaggery which is an important article of food. The "training" and tapping of the inflorescence are elaborate processes which only skilled tappers alone are capable of. In strong, healthy individuals 10 to 15 litres of toddy may be obtained per day. Sometimes, in an unusually prolific palm, three or even four spathe may be seen being



Fig. 6. A wild date in West Bengal being tapped for toddy

tapped at the same time, while others, in spite of the most careful training yield no toddy at all.

6. The date palm

The date palm (*Phoenix dactylifera*) is one of the oldest cultivated tree crops. Records in Mesopotamia show that its culture, primarily for the edible fruits was probably established as early as 3000 B.C. The

importance of the date palm is very extensive. A considerable part of the inhabitants of Egypt, Arabia and Persia subsist almost entirely on its fruits. They make a conserve of it with sugar, and as Blatter mentions, even grind the hard stones in their hand mills for their camels. The most relishing and wholesome way to eat the date fruits is when made into a paste, mixed with barley. Roy W. Nixon (U.S. Date and Citrus Station, India) gives the following composition of the date fruit. The dry flesh of the ripe date contains about 75 to 80 per cent sugar. In most varieties, including nearly all the soft dates, this sugar is almost entirely of the invert type (glucose and fructose). In some dry and semi-dry varieties there is a relatively high proportion of cane sugar (sucrose). From the analysis data available, it appears that on a dry basis there is as much variation in the percentage of total sugar within a variety as there is among varieties. However, there are characteristic differences among varieties as to size of fruit, percentage of moisture, and consequently total amount of sugar per date.

The flesh of dates with a moisture content of 20 per cent contains 60 to 65 per cent sugar, about 2 per cent

fibre, 2 per cent protein and less than 2 per cent each of fat, mineral matter and pectic substances. Such fruit will furnish about 1,430 calories per pound. The nutritionally important elements in the mineral constituents are present in sufficient quantities to classify the date as a good source of iron and potassium and a fair source of calcium, but a poor source of phosphorus. There are also moderate quantities of chlorine, copper, magnesium and sulphur. Dates contain small amounts of vitamins A, B₁ and B₂ and are good sources of nicotinic acid, but they contain only negligible quantities of other vitamins.

7. The wild date

As the name suggests, the wild date palm (*Phoenix sylvestris*) grows in the wild stage throughout upper India and is very valuable as source of 'neera', palm sugar and other products. In the Punjab alone where it grows wild in all the districts in the riverine areas, there are about two million tappable palms. These are potentially capable of yielding half a million maunds of gur giving direct employment to 20,000 tapper families and five thousand potters, blacksmiths and carpenters for their livelihood with earnings to the value of ten million rupees.

The wild date is tapped during the colder months by wounding a portion of the tender stem covered by the older leaves. The sweet sap that exudes from the stem after adequate paring and 'training' is collected by hanging a mud pot just beneath the notch. The wound is freshened at close intervals to extract the maximum sap. A palm may yield continuously for four months. The same palm is tapped year after year which displays the tapping notches on the stem permanently (vide Illustration 6). A palm in 24 hours may yield as much as 10 kg. 'neera' which is consumed fresh or converted into jaggery. Neera stalls are very popular in

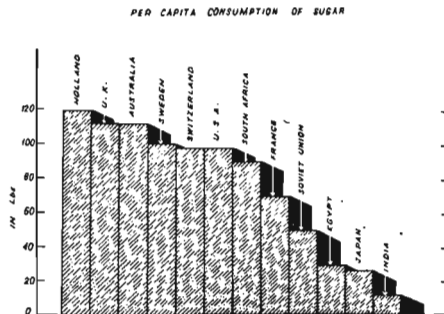


Fig. 7. Per capita consumption of sugar in various countries

Bombay, Poona, Delhi and a few other cities and towns.

Any account on Indian palms is incomplete without a reference to the commendable work being carried out by the Palm Gur Organisation towards the improvement of the palm industry. The coconut, palmyra, fish-tail palm and the wild date come under their purview, and the Organisation is primarily interested in producing food from these palms. Apart from the coconut which is not usually tapped, there are about 86.6 million palms in India (28.8 million date palms, 57.7 million palmyra and 0.1 million fish-tail palms). Out of these, 50 million palms are tappable, capable of yielding 1.5 million tonnes of gur per annum, employing 1.8 million tappers and over half a million ancillary rural artisans. But out of this, only about 6 million palms are being tapped (Y.A. Panditrao, *Tadgur Samachar*, April 1960). The Palm Gur Organisation through the over 2,600 Palm Gur Cooperatives is endeavouring to bring more palms under the clutches of man and to increase the sugar output of our country. From illustration 7, it is apparent that the per capita consumption of sugar is the least for India which is about one-eighth of that for many countries. This deficiency is partially made good by consuming palm jaggery and palm 'neera'.

The palm gur industry apart from producing food, also helps grow more food. In India, about one hundred thousand tonnes of palm gur are produced every year. To produce



Fig. 8. Tinned palm Cabbage

cane sugar worth this amount about 45,000 acres of fertile land would be used for sugar plantation. Therefore, our tappers are saving 45,000 acres of land for growing cereal crops.

Palm cabbage as food : Most of those living amidst palms and even some visitors from the temperate regions have tasted a lesser economic product of palms, namely, the 'palm cabbage' or 'heart of palm'. Palm cabbage is in most ways compared in flavour and use with ordinary cabbage. It has a mild sweetish (or slightly bitter in inferior species) nutty flavour when eaten fresh, but a smoother asparagus-like texture when cooked. Analyses of food value of palm cabbage also show that it is fairly similar to the true cabbage. The Cabbage of many species of palms is edible although some may be bitter. That of *Oramia* is reported to be poisonous (W.H. Hodge, *Principes*, October, 1965). The cabbages of all the palms described above are edible. In addition, the

genera, *Euterpe*, *Prestoca*, *Roystonea*, *Sabal* and *Welfia* are well known for their sweet and succulent buds. The best quality palm cabbage appears to come from the genus *Euterpe*. In Brazil, palm cabbage, locally known as *Palmito*, is used almost universally fresh as well as tinned ones (vide illustration 8). Apart from the heavy local consumption, *Palmito* is exported in large quantities from Brazil. According to W.H. Hodge, in 1961 alone 662 tonnes of palm cabbage valued at U.S. \$ 22,000 were exported.

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