

Chapter 1

Introduction



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Abstract This chapter introduces the coconut palm to the reader. The coconut, *Cocos nucifera* L. (family Arecaceae), has been the most useful plant to the humans since every part of it has been finding an active economic use. Its importance has been diminishing in the present era. Coconut palm is the hallmark of the tropical beaches with its often slanting trunks and symmetrical crown. The members of the family Arecaceae are unique among plants because they are the longest living plants, since stem cells of several kinds remain throughout the life of palms.

For about a century from the dawn of the Industrial Revolution, the coconut oil was the most traded among all the vegetable oils. Its importance began to diminish with end of the Second World War. When the FAO began to publish area-production figures in 1961, the rank of the coconut oil had come down to 4th out of 14 traded vegetable oils in the world, and in 2011, it ranked as low as 11th. The reasons for the downslide have been analyzed. There are certain unique aspects of the coconuts in the world in matters of production and consumption that have been recorded for general information.

1.1 Introduction

The coconut palm (*Cocos nucifera* L., family Arecaceae) has been the most useful plant species to the humans (Nayar 2016). Every part of the palm was being put to active economic uses from very ancient times. The setting in of the Anthropocene Age has been marked in the coconut including those who habit the regions where the coconut is the “staff of life,” but the status of coconut palm has continued largely as before in most of the regions of the world where the coconut matters. The coconut palm is the most ubiquitous plant species in the more than 30,000 islands that jot the tropical and subtropical seas of the Old World and in their littoral regions.

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It has been an integral component of the legends, lores, ethnobotany, and lives of the people of these vast regions from prehistoric times (Nayar 2016).

The coconut oil was the most traded vegetable oil for about a century from the mid-1850s until the end of the Second World War (1950s). Some of the European imperial powers had then set up large coconut plantations in their overseas colonies. In the years following the Second World War, the preeminent position began to slip down steadily, and presently, it is in a pathetic 11th position among the 14 oil crops for which the FAO reports production figures. There are several reasons for this. This may find an analysis in some of the following chapters.

1.2 The Uniqueness of the Palms

John Dransfield, the best known authority on palm taxonomy, has observed about the coconut palm that “the often slanting stems and graceful crowns of the coconut are largely responsible for the palms being considered the hallmark of the tropics” (Dransfield et al. 2008). Peter Tomlinson, the doyen of palm biology, has stated that “the palms are emblematic organisms of the tropics.” They are the world’s longest living trees, because stem cells of several kinds remain active in different tissues, throughout the life of the palms. Palms are distinctive from the other groups of organisms in that they can make tall and long-lived trees entirely by primary developmental processes, i.e., all the tissues are the direct result of continuously active root and shoot apical meristems. These explain why we are able to successfully transplant palms of any age at any new location. These are the attributes that make the palms in general and the coconut in particular unique and different from other plant species (Tomlinson 2006).

1.3 Development Perspectives of the Coconut Sector

The present status and the outlook for the coconut do not present a rosy picture. In the early 1960s, the coconut accounted for nearly $\frac{1}{4}$ of the total oil crops production and ranked 4th during the year 1961 in nut production among all the 14 vegetable crops recognized by the FAO – the first year from which the FAO began to maintain production statistics. In 2011 AD, after 50 years, it had come down to less than $\frac{1}{7}$ th (Tables 1.1 and 1.2) of the total oil seeds production. Presently, in 2018 the coconut is grown – or it occurs naturally – in 94 out of 284 countries and territories of the world (FAO STAT 2018).

1.4 The Poor State of Affairs of the Coconut

This is obvious from the data given in Tables 1.1 and 1.2. During the 50-year period, 1961–2011, the areas under coconut and total oil seeds increased by 2^{1/2} times and of rice by about 2 times. During this period, while the production of rice and oilseeds increased by more than five times each, that of the coconut increased by 2^{1/2} times only.

Table 1.1 Area and production of coconut, oil seeds, and rice 1961–2011

Commodity particulars		Year		
		1961	2011	Increase (%)
Coconut	Area M ha	5.3	12.0	251.2
	Production Mt	22.9	57.2	249.8
Oil seeds	Area M ha	113.6	280.1	246.6
	Production Mt	104.8	550.9	525.7
Rice ^a	Area M ha	115.3	215.7	187.1
	Production Mt	162.3	738.2	455.5

Source: Calculated from data downloaded from FAOSTAT, 11 July 2014

^aRice data given for comparison

Table 1.2 Production of vegetable oils in the world^a

Crops	Production 10 ⁶ t and ranking	
	1961	2011
Coconut oil	1.6 (4): 8.6%	3.1 (9): 1.95%
Cotton seed oil	2.2 (3)	5.2 (7)
Groundnut oil	2.5 (2)	5.7 (6)
Maize germ oil	1.5 (6)	2.3 (10)
Olive oil	1.3 (7)	3.6 (8)
Palm kernel oil	1.1 (8)	6.0 (5)
Rape and mustard	0.1 (12)	22.9 (3)
Rice bran oil	0.4 (10)	1.1 (11)
Sesame oil	0.4 (10)	1.1 (11)
Soybean oil	3.0 (1)	41.9 (2)
Sunflower oil	1.0 (5)	13.4 (4)
Other oil crops	2.2 (Not applicable)	16.1 (Not applicable)
Palm oil	0.4 (9)	48.5
Vegetable oil, total	18.6	159.2

^aCalculated from data downloaded from FAOSTAT, 11 July 2014

The total production of oil has remained stagnant in 4/14 oil crops, coconut, cotton seed, groundnut, and maize germ; the production has increased 2–6 times in another four oil crops – olive, palm kernel, rice bran, and sunflower – those of oil palm, rape and mustard, and sunflower have increased phenomenally.

Each success story has been a different one: in a nutshell, in oil palm through low pricing and deft marketing, in cotton seed and rape and mustard through the removal of anti-nutritional factors, and, in sunflower, by improving its adaptability and expanding cultivation. In the coconut, no effort whatsoever has been done to either remove the stigma, about its consumption, or expand its uses. Hybrid coconuts give enhanced yields, but its impact on overall yield may be still insignificant.

1.5 Causes for Decline of Coconut

Let us now analyze the reasons for the decline of coconut from the 1950s. From this time, the soybean lobby in the USA mounted a strong lobbying against the palm-based vegetable oils (meaning coconut and oil palm oils highlighting the presence of anti-nutritional factors in them). There was then a prevailing suspicion that the polysaturated fatty acids present in the palm oils can cause cardiac problems. They managed even to get the American Medical Association to promote their stand. The palm oil industry undertook massive R&D efforts, to overcome the problem. They soon managed to develop a technique to fractionate the polysaturated fatty acid and market a liquid form of palm oil (palm olein) and market it at highly lower prices. No similar efforts were done in the case of coconut oil, even though it had the advantage that most of the saturated fatty acids contained in the coconut oil consist of medium- and short-chain fatty acids (Nayar 2016). For this reason, coconut oil continues to carry the stigma of having high levels of saturated fatty acids, while the case of palm oil is hardly ever raised because of its great price advantage also. This situation has had an adverse effect on the use and consumption of coconut and its oil (Tables 1.3 and 1.4).

Notwithstanding the above, the local populations of the countries of the world continue to use significantly high quantities of the coconut, its oil, and/or both

Table 1.3 Changes in production and the use of coconut and coconut oil, 1961 and 2011

Crops	1961			2011		
	Production 10 ⁶ t	Food %	Processing %	Production 10 ⁶ t	Food %	Processing %
Coconut	22.9	31.0	62.8	57.2	35.8	40.1
Oil seeds total	104.8	14.4	70.6	550.9	8.7	76.7
Coconut oil	16.0	88.8	0.12	3.1	67.8	0.42
Vegetable oil total	18.6	77.1	0.35	159.2	50.6	0.28

Source: Data from FAOSTAT, 11 July 2014

Table 1.4 Changes in food supply of coconut and coconut oil, 1961, 2011^a

Item	Food supply capita ⁻¹			
	(kg year ⁻¹)		Kcal day ⁻¹	
	1961	2011	1961	2011
Coconut/copra	2.3	3.0	9.0	11.0
Oil seeds (total)	4.9	7.0	38.0	57.0
Coconut oil	0.5	0.3	11.0	7.0
Vegetable oils total	4.7	11.7	113.0	280.0

^aDomestic supply, and not production, is used for calculation

Table 1.5 Countries of the world where the food supply of coconut and coconut oil is among the highest, 2011

Countries	Food supply			
	Coconut		Coconut oil	
	(kg cap ⁻¹ year ⁻¹)	(Kcal cap ⁻¹ day ⁻¹)	(kg cap ⁻¹ year ⁻¹)	(Kcal cap ⁻¹ day ⁻¹)
Fiji	62.9	190.0	3.2	77.0
Kiribati	123.2	62.1	5.0	120.0
Philippines	3.4	10.0	3.4	82.0
Samoa	173.8	530.0	3.7	91.0
Sao Tome and Principe	136.7	348.0	1.4	34.0
Solomon Island	143.0	226.0	0.8	22.0
Sri Lanka	66.3	272.0	2.2	55.0
Vanuatu	136.4	374.0	3.7	50.0
World	3.0	11.0	0.3	7.0

Source: FAOSTAT, downloaded 11 July 2014

(Table 1.5). Incidentally, there are no reports of any higher incidence of any coronary health problems in these countries.

1.6 Major Coconut-Growing/Coconut-Using Countries

The major coconut-growing countries of the world are listed in Table 1.6. Generally, such lists give advantage to the larger countries. To provide a better perspective, the countries are ranked with four criteria. They provide revealing insights. For instance, the Philippines, which ranks first or second in 3/4 criteria, is ranked last in the terms of yield ha⁻¹.

Further, there are some countries that have more area under coconut than the reported net cropped area of the respective country (Table 1.7). This appears to happen because coconut occurs naturally in such countries.

Table 1.6 Leading coconut-producing countries of the world, 2013^a

Country	Area (M ha) ^b	Area (% net cropped area) ^b	Production (Mt) ^b	Yield (t/ha) ^b
Brazil	0.26 (6)	0.35 (11)	2.82 (4)	11.0 (1)
India	2.16 (3)	1.38 (9)	11.93 (3)	5.5 (5)
Indonesia	3.00 (2)	12.77 (3)	18.3 (1)	6.1 (4)
Malaysia	0.11 (11)	3.67 (7)	0.61 (10)	5.4 (7)
Mexico	0.17 (9)	8.50 (4)	1.10 (8)	6.5 (3)
Philippines	3.55 (1)	65.02 (2)	15.35 (2)	4.3 (10)
Sri Lanka	0.42 (5)	8.00 (5)	2.2 (5)	5.2 (8)
Thailand	0.20 (8)	1.26 (10)	1.01 (9)	4.8 (9)
Tanzania	0.68 (4)	4.69 (6)	0.58 (11)	0.9 (12)
Vietnam	0.14 (10)	2.14 (8)	1.31 (6)	9.6 (2)
Papua New Guinea	0.22 (7)	73.44 (1)	1.20 (7)	N.A. (6)

^aSource: FAOSTAT downloaded 21 October 2014

^bFigures in parenthesis give relative ranking in the respective item

Table 1.7 Coconut-growing countries of the world having relatively large areas under coconut

Countries	Country area (000 ha)	Arable area (000 ha)	Coconut area (000 ha)	% area under coconut
Fiji	1827.0	165.0	65.0	39.4
French Polynesia	400.0	2.5	22.0	880.0
Kiribati	81.0	2.0	30.0	1500.0
Maldives	30.0	3.0	1.1	36.7
Marshall Islands	18.0	2.0	6.5	325.0
Micronesia	70.0	2.0	17.0	850.0
Papua New Guinea	46,284.0	300.0	220.0	73.3
Samoa	284.0	8.0	27.0	337.5
Solomon Islands	2890.0	19.0	53.0	278.9
Sri Lanka	6561.0	1250.0	420.0	33.6
Tonga	75.0	16.0	9.3	38.1
Vanuatu	1219.0	20.0	98.0	490.0

Source: Calculated from data sourced from FAOSTAT, downloaded 21 October 2014

1.7 History of the Taxonomy of Coconut

The coconut is taxonomically *Cocos nucifera* L. (Sp. pl.1188 (1753)) (Dransfield et al. 2008). The classification of the species from the family downward is given below.

Family – Arecaceae/Palmae

Subfamily – Arecoideae (one of the five subfamilies)

Tribe – Cocoseae (1 of the 14 tribes)

Subtribe – Attaleinae (one of the three subtribes)

Genus – *Cocos* (1 of the 12 tribes)

Species – *nucifera* (monospecific)

Linnaeus used as type specimen the figure of the coconut palm and its parts given in the chapter on coconut – “Thengu” in the 10 volumes on the herbals of Malabar Coast, *Hortus Malabaricus* (1678–1693) written in Dutch language and published from Amsterdam. The figure of the type specimen and chapter on coconut are reproduced as annexure to the chapter.

1.8 Brief History of *Cocos* Classification

The genus *Cocos* is now monospecific. But it has been so only since 1966. Prior to this, new species were being added to the coconut. Beccari (1916) transferred all the more than 90 *Cocos* species and then included *Cocos* to other genera (except *nucifera*), mostly to *Butia* and *Syagrus*, (refer also IPNI list 2015). This list has 180 extant names of *Cocos nucifera*.

**Annexure I: Description of Coconut (*Cocos nucifera*) Given in
Linnaeus C (1753)**

HORTUS MALABARICUS
ON VARIOUS KINDS OF TREES
AND PODDED FRUITS

Described in Latin; Malayalam, Arabic and Brahmanic characters and names,
with the addition of a true delineation of flowers, fruits and seeds in their natural size
and with an accurate description of (their) colours and properties

Adorned by
The Most Noble and Generous Lord
HENRY VAN RHEDE TOT DRAAKESTEIN,
Chief ruler in Mydrecht, once the Governor of the Supreme Council of the Malabar Kingdom,
Extraordinary Senator among the Indian Belgians but now one among the Renowned and
Most Valiant Nobles of Utrajactine Province under the name of Equestrian Order

and
THEODORE JANSON of ALMELOVEEN, M.D.

Enriched with notes and illustrated with commentaries by
JOANNES COMMELINUS



Printed at Amsterdam
with the expense met by: Widow of John van Someren, heir of John van Dyck,
Henry and Widow of Theodore Boom
in the year 1678.

PART ONE
OF
THE MALABAR GARDENS
ON
TREES

Tenga



TEGA, in the language of the Brahmins *Mado*, is a tree with erect stem, rising high and growing in sandy soil. The root with thick bark (which is) reddish and turns dark is internally with soft wood, spreading (its) fibres copiously and transversely.

The stem erect, one foot thick, with the maximum thickness coming up to two feet in one part with leafy branches which arise only from the apex growing taller and taller (higher and higher) surrounded at the tip in a decussate manner like a crown, and in the bark on rind turning dark, which cannot be peeled off, grooved (furrowed) with semicircular rings and marks by which the base of the branches were attached, and consists of less hard wood, and interwoven with thick filaments and becoming red or reddish, inwardly soft and more hard towards the bark, when older, is more hard and more dark, which when exposed to open air, is liable to rooting within two or three years, is more durable under water, the apex of which is surrounded by tender branches, while becoming taller and taller tapers into a cone and consists of a soft and whitish pulp or core which is called *Palmita* in Portuguese language, which on the outside is covered with various mutually intertwining coating

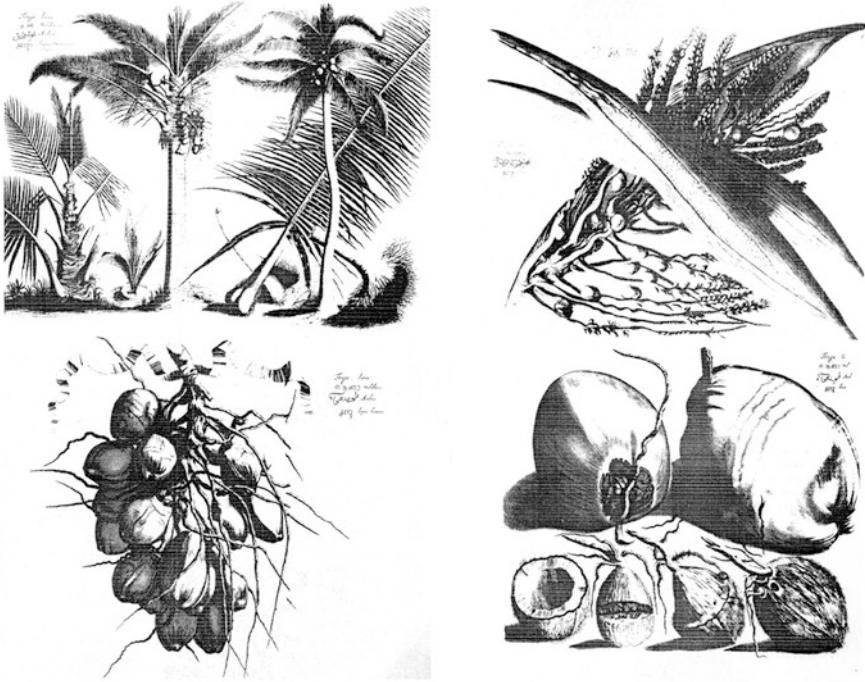


Fig. 1.1 The type specimens of coconut *Cocos nucifera* L .
Figures given in Linnaeus C (1753)

and inside is solid. When *Tenga* is young and one cubit in height, this is sweet and is of pleasing taste, when older, of less pleasing and astringent taste, and with no sweetness at all, when taller and older is of more sweet and most pleasing taste, emulating our walnuts, and is edible, and is much sought after by elephants, which because of its extreme liking, uproots these trees. The foliage branches are simple, not divided into others, in the base by which they tightly cling to them, interiorly plane and concave and from above interiorly reduced to a pointed curving protuberance, externally on the whole convex, broader in the lowest part of its base and thence gradually becoming narrow and becoming thin at the edges, and with a red-brown, reticulate, smooth rind the filaments of which arise from the margins of the base on both sides, first clothe all around the stem and mutually cover themselves, and are as if with a yellow green bark and inside consisting of hard woody filaments covering soft, whitish flesh. Those that are older droop down from the stem and are curved, then fall down one after another at fixed time, while others arise anew from the apex of the stem.

The leaves which cover the upper part of the branches up to their flat part where they are thinned down to the belly and arise obliquely in the margins and are placed opposite to each other, and are narrow, oblong, more or less six cubits in length, three transverse fingers in breadth, from the origin (base) gradually contracted to a narrow point, with a very flat surface, grooved (marked) lengthwise on the lower side, with parallel and subtle veins, towards the base with a whitish light yellow suture curving to an angle, are inserted and towards the exterior part somewhat closed from the angle of the suture and in the interior which meets with the interior surface of the branch is a rib standing out very much, which marks the exterior part with a furrow, situated in the middle, is of dark and shining greenness, when they wither they turn yellow, are of no taste and smell except that of forest (wild).

From above the origin of the foliaceous branches from the stem, there arise oblong capsules in which tender flowers and fruits inserted to stalks are enclosed; these capsules are round and somewhat smooth, three or four spans long, more narrow and more yellow towards the base and at the tip constructed into a cone, almost half a finger in breadth, the thick rind striated lengthwise with veins and woody filaments, externally green and marked with furrows and layers which deepen towards the tip, internally and smooth.

The fruit – bearing stalks, while enclosed within the case are smooth and shining and are glandular towards the base, (are) angular and curved with undulating hollow spaces, some (are) more straight others proceed in a somewhat zig-zag fashion (and) are placed around a more thick middle branch, and tapers to a point towards the tip of the case (capsule) and are closely packed together and on rupture of the capsule they spread out

obliquely from the middle branch in all directions and are covered with a thicker rind, at first when soft and tender and enclosed within the capsules are light yellow or whitish yellow and then becoming more yellow and more red and finally turning green. On these stalks within the case, the flowers and fruits arise in due order that fruits come out from parts lower than the flower buds.

The flower buds are whitish – slight yellow spikes which later become more and more yellow, smooth and shining, some are more flat while others are more round (they are) tightly held in small, trifoliate, whitish yellow calices and (are) closely packed together when they are within the capsule, as they increase in size they break out of the capsule along with their stalks, (are) loose (not compact) and are placed sideways (transversely) or a little anteriorly or bent back with its tip, and they open into three leaves, which along one margin are more round and cuspidate at the tip, are hard, rigid and thick and have six yellow stamens in the middle, which are provided with oblong thick, first erect and then drooping apices and arise from the axil of leaves and with these (is) a short thick and whitish style which is trifid at the top, and are of pleasing smell, like that of lily though weak, the flowers immediately fall away from the stalk after they had broken forth from the capsule.

The fruits which arise together with the flowers in the oblong capsules and are tightly (attached to the stalk below) inserted on the stalk below the flowers, are quite large when they reach maturity and are like nuts consisting of woody covering which internally towards the interior surface of the covering or testa are covered with a cavity which is filled with water or a liquid, these when they are tender and break forth from the case, with the spikes, are round in shape and whitish yellow in colour and are tightly and wholly covered with a whitish yellow calyx which is formed of round leaves mutually rolled round, inside under the covering by which they are wrapped around (are) with thick whitish flesh, having no cavity, later, as they grow in size with age are oblong to angular in shape, increased greatly in length, less in breadth, growing green and shiny in the outer covering the leaves of the calyx from which the fruits protrude, becoming red from reddish, in these (fruits) a narrow oblong mark of a cavity to be introduced later with more growth (as they increase in size) (is seen) in the bottom part or towards the base of the fruit, before the cavity is formed, these tender fruits are called *Belleca* by the Malabari, *Coquinhos* by the Portuguese, when the cavity already formed the fruits are first filled with water and these are called *Caricu* by the Malabari, *Carica* by the Portuguese; when the growth of the cavity is over, after each one has

been filled with its water, each one is covered lined by a kernel along the internal surface of the covering.

What is to be noted about the cavity is that it is very oblong and narrow in the tender fruits and along with the fruit first it increases more in length than in width, is limited by an oval shape, the more acute angle of which is situated towards the top of the fruit, in older fruits however it is approaching the elliptical or round shape: the kernel of the fruits which grows for certain interval of time is sought after in eatables, at first is tender, white and light azure, with pleasing and sweet taste, not at all oily, later becomes white and more and more hard, when hard (it is) with the taste of nut and the more older and the more harder (it is) of the taste of oil, when ground and crushed it gives out a milky liquid which is of the taste of milk, but is somewhat oily, when very old, most oily and becomes azure blue because of oil, emitting strong smell of oil which is not quite pleasing.

According to the different names, when it is tender and similar to milk and soft it is called *Corumba* by Malabari, when it is complete (full grown in size) and does not enlarge any more, it is called *Elani* by the Malabari and *Lania* by the Portuguese, when it is somewhat hard, is called *Malinga* by both Malabari and the Portuguese, when hard, is called *Tenga* by the Malabari and *Coquo* by the Portuguese, when still more hard, (it is called) *Barettu Tenga* and when really hard, (is called) *Cotta Tenga* by Malabari and *Coco Sicco* by the Portuguese. As for the water inside the cavity, this, in a tender fruit known as *Caricu*, (is) slightly biting, a little salty and a bit acidic, less sweet, then as the fruit gets older, it becomes more and more sweet; in an old fruit like *Barettu Tenga*, (it is) at once very sweet and salty, before the formation of the kernel, it is clear and very hispid like water. As the kernel is being formed it is turbid or less hispid and becomes pale white; from the fruits known as *Caricu*, which is already filled with all its water, when a small narrow hole is made (it) gushes forth with great force in sprays, less (water) (comes forth) from the fruits which is filled with kernal, like *Corumba* or *Lania*. The water in *Malinga* has this property that when the liquid called *Suri* is notably shaken by fermentation towards the eye, when the kernel is hard and begins to dry within the fruits, is poured into a vessel and exposed to air, loses its sweet taste immediately and is rendered slightly acidic, if it is shaken by wind, without any fermentation, lest this way the water of the fruit *Malinga* loses all its fermentation.

Regarding the covering surrounding the water and the kernel, it is first soft and in the fruit *Corumba* is still tender and edible and is of the taste of walnut, when smeared with lime, it first becomes yellow then is tinged with green-dark colour, the more the fruit is old and the kernel is the more hard, it also

becomes hard, and when is of the maximum hardness, it is less liable to cutting, is striated in length by three protruding sutures on the outside and in the lower part in between the sutures is provided with three closed eyes, of which one is larger and less hard, is situated between sutures which stand more apart, (it) is in use with the goldsmiths because of the hot flames it gives.

The exterior rind surrounding the covering is first whitish, as in the fruits *Coquinhos* when they are very tender, then it turns green, and when they get older, (with more age) it turns yellow from green, when the fruit is more old and begins to dry up and is finally dry, it is ashen dark and in the beginning it is soft and this, then consists inside of soft, white and thick flesh which in *Lania* is tender and is still soft and easily pervious to cutting, and when smeared with lime is tinged with yellow colour; later becomes more and more hard, is interwoven in the flesh, with woody fibres suitable for making ropes, which closely adhere to the woody covering towards the outside.

As regards the external shape, these fruits are round when very tender, oblong round as they grow older and with three obtuse angles projecting towards the part of sutures, when more old less oblong, and when very old the shape is more contracted (narrow) than *Lania*; in old coconuts, towards their basal part, inside the hard kernel arises an oblong – round whitish eye, which later becomes yellow, it is the young sprout of the fruit, which when laid in soil gives out a new shoot from the upper part through the less hard and more broad eye of the covering and from the lower part it gives out 'piram' called by Mal., *Pongo* in Portuguese, which grows larger and larger as the water in the meantime gets dried up and fills the whole cavity; the new shoot coming out of the eye, springs out of the covering, a little bent, bores through the external covering and gives out rootlets from the lower part, which first running obliquely through the exterior covering and finally rupturing it, fix themselves here and there: the *piram* (*pongo*) which arises in the cavity is white and in the constricted part, by which it comes out of the eye, is light yellow, is externally striated in length, with wrinkles, and is granulated and besmeared with oil, inside is fungus-like, humid soft and white, is edible, is with a taste more sweet than the kernel but rather disgusting (fastidious).

From this tree also comes the liquor *Suri* which is a drink like wine having inebriating power, is of pleasing taste, is a bit sweet, slightly saltish and slightly acidic, when first taken out, is with greater sweetness, when gets old is more acidic, is of a colour from whitish to azure blue and pallid, covered with bubbles or froth on the surface, and within a short time ferments and

during fermentation producing a hissing noise and throwing out in air tiny drops like strong and vigorous wine, having also the power of fermenting a mass of flour, especially when it is more sweet, is a liquor that serves with great advantage (can be easily put to many uses) from which is formed a strong wine which has the power of intoxicating vinegar, sugar, called *Iagra*, this liquid is tapped by those called *Chegues* thus:-

They cut the tip of the fruit-bearing or flower-bearing capsules called '*Mammam*' of the tree and hang a vessel to it and at a distance of four fingers down the tip, they cut the rind of the capsule obliquely, they lift the cut part towards the tip forming what is called "beard" so that the liquid from the cut tip flowing through the rind of the capsule, may fall into the suspended vessel from the lip, they cover the cut tip with certain mud or with leaves of *Vetti Tali* or with the shavings of the green outer rind, in order to close the holes situated at the tip, lest the liquor suri oozing from the shoots (stalks) which are inside the capsule should spread within the capsule itself: they tie round the capsule at the incision with rind that is detached from the foliaceous branches, lest it should break; the *Mammam* or capsule, after the tip has been cut for the first time, gives *Suri* after five days, and is a liquid which first exudes with a reddish colour; they take away the vessels with *Suri* twice a day i.e. in the morning and in the evening according to the common usage, thrice with also at noon; the vessels before being suspended are well washed and purified from any liquor; whenever they are suspended, the tip is cut and smeared in the manner mentioned above and further the *Mammam* is beaten in four parts near to the margin (mouth) (edge) but not in the mouth itself nor in between two edges, with a bone filled with butter, this beating is lest the liquid is intercepted and get stuck but may remain more easily and freely and so much copiously, this liquid called *Suri* which is taken at noon in vessels hung in the morning, is sweet what is taken in the evening slightly acidic, (that which is taken) the next day, turns sour the third day, the sweet liquid is rendered acidic, losing all its sweetness; the liquid which is taken from a tender (young) tree is less strong and vigorous than that from an older and taller tree, and less spirited so much so that it gives less of strong wine when distilled, emits the smell of the soil in which it grows; the liquid which the trees that are quite old give, (flows) in less quantity and is more sweet and more intoxicating; strong wine' (spirit) is extracted by distilling after adding some drops of cocos oil from this liquid after it has been kept for a day in the vessels which have been removed; in order to make vinegar from it, they put the vessels in which the liquid is collected, in lime for fifteen days, by which provoked to vehement fermentation.

It is changed to vinegar forming much froth and depositing in the bottom of

a vessel a whitish material which is of ashen colour; sugar called *Iagra* is made from this liquid thus into the vessels which they hang to the *Mammae* of trees, they put a little lime just enough to tinge the liquid collected in, with red colour. For, if the lime is superfluous, the liquid is more whitish and milky by the colour of the lime if less lime is added the liquid turns white by its own colour, thus they cook this liquid *Suri* thus mixed and sufficiently steeped with lime. Shaking it continuously with a spoon, till it is thickened then red sugar is obtained; it is to be noted that from the liquid *Suri* collected drop by drop to which less lime is given, sugar cannot be made, if more of lime is added, to that it settles down, mixed together, at the bottom, in order to make sugar. First the remaining lime has to be removed; in making white sugar or *Iagra*, this besides is observed that they transfer the liquid *Suri* mixed with lime into different vessels for the separation of lime, changing the vessels thrice, namely if it is taken in the morning at noon it is poured into a new vessel, leaving the lime that has settled down at the bottom, thus again at 2 o'clock and in the evening is poured into a new vessel and boiled.

This tree is very voracious, especially that which grows in salty soil and near the sea. That which grows in mountainous regions is less prolific and gives less fruits or *Cocos*. The water of which is of less sweet taste and less pleasing and gives the liquid *Suri* in less quantity, but is more strong; is of the greatest vigour from the twenty first to the thirtieth year of age, producing larger and more fruits or *Cocos*. So also bigger capsules or *Mammæ* in which they are enclosed, and pouring down the liquid *Suri* more abundantly, from the time it gives fruits, always produces, new fruits. The mature ones falling down, when is of old age, (fruits are of) smaller size and are less abundant; the liquid *Suri* which an older one gives is also in small quantity, though more strong and more sweet. Ordinarily lives for hundred years; while is languishing and is close to death, all the foliaceous branches turn yellow and look as if burnt.

It is observed about this tree that in the third year after sowing it is clothed with branches which have grown to the right size, and from that year branches begin to fall and stand up to the height of one and half or two men and the stem which is completely clothed around and covered by branches is not more than one cubit in height, with the thickness equalling one foot: ordinarily every month a new branch comes out, in the meanwhile the old ones fall down, the falling of branches is more frequent during the summer than in the rainy season, within the space of three months the branches grow to the right size, for example those which come out after the third year of planting; before the appearance of capsules or fruit bearing *Mammæ*, branches are of greater length than after, in a big tree ordinarily more or less twenty eight

branches are found; they produce capsules with their fruits at times in the third, or fifth or eighth or tenth year of planting, according as the soil is more or less good, cobs which come out in between each of the seven branches which come out from the tip of the tree, reach their right size within the space of three months and opens up on the fifteenth day; flowers fall away on the fifth or sixth day after the opening of the cob. In a tree, ordinarily there are twelve branches of *Cocos*, one bunch bears dry *Tenga*, *Cocos* called *Barettu Tenga*, or *Cotta Tenga*, another (bunch) bears mature fruits called *Palupen Tenga*, which are with flesh more hard than in *Maninga* less hard than *Tenga*; third branch (which) bears immature fruits called *Belacca - Caricu* fourth (bunch of) fruits called *Maninga*, fifth (bunch) fruits called *Elani*, sixth fruits called *Curimba*, besides two opened *Mammae* and four closed (ones).

From the tender fruits and from those which first break forth from the *Mammae*, ordinarily fifteen or sixteen fall away from the branches, the others growing into *Cocos*, in the third month after the opening of the *Mamma*, fruits acquire a little of water. in the sixth month they are filled with all their water, then in the space of three months they are filled with all their kernel which becomes hard after three months and then coco falls from the tree, however one month before falling the water is diminished and the eye appears in the kernel; one month after the fruit has fallen down, the *Pongo* appears which within the space of one month, fills the whole cavity; within which time, if the coco is put in the soil, a short white new branch arises from the eye to the height of one cubit.

Its Powers

The root boiled in water with dry ginger and drunk is useful in warm fever, the same well crushed and decoction made with the oil of the fruit or *Coco* is employed in washing the mouth for blisters arising in the gum; the juice squeezed out from tender branches and mixed with a little honey is applied to eyes in lotion to soothe pain, juice of leaves with oil of the fruit or coco, given in decoction helps in haemorrhages, flowers eaten with *jaggery* helps those urinating purulent matter; juice pressed out from flowers and given in cow's milk is good in gonorrhoea; the cob of the flowers crushed and boiled with oil and besmeared is useful in ulcers caused by burning, juice expressed out from tender fruits helps in blisters of the mouth in infants when washed with it, as also for sore -eyes used in the same way.

Canjee water drunk with flowers is helpful in extinguishing burning of liver; the same in repeated lotion of the head is conducive for the redness of eyes;

the kernel of the fruit or coco chewed is good for blisters of the mouth; oil extracted from the kernel and smeared dries out blisters of head; the same employed in the same way is also useful for haemorrhages; the *Pongo* which grows from the water in the cavity, fried with rice is given for coughs originating from melancholy, from the bark of the tree an oil is pressed out, with which is smeared the part affected by skin disease caused by worms.

Cocos nucifera L., Sp. Pl. 1188. 1753; Moore & Dransfield, Taxon 28: 64. 1979; Manilal & Sivar., Fl. Calicut 300. 1982; Sasidh. & Sivar., Fl. Thrissur 481. 1996; Sivar. & Philip, Fl. Nilambur 747. 1997 [ARECACEAE].

Tenga Rheede, Hort. Malab. 1: 1-8, tt.1-4. 1678.

Thenga (Malayalam script on tt. 3, 4) is the coconut fruit and thengu (t. 1) is the coconut palm. Thengumpookkula (Malayalam script on t. 2) means coconut (thengu) inflorescence (pookkula), the subject of t. 2. Poo is flower and kula bunch. The names of the fruits at their different stages of growth, which are still in use today, are given in the text.

Coconut is one of the most important cash crops of Malabar and is abundant in coastal areas. All parts of this plant are used by natives, for various purposes. Fermented sap (phloem exudation), called toddy, is used as an intoxicant; fresh toddy is a health drink. The sap is extracted from the inflorescence (spadix) after various pre-treatments [described generally in the text]. The word Thenga means honey-fruit; "then" is honey and "nga" (or ka) is fruit in local language Malayalam. The allusion is to the sweet water inside the nut.

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Annexure II Relevant pages from Linnaeus (1753) Sp. Plantarum (page 1188) enumerating the latin binomial of the coconut. <http://bioversity.library.org/>
35209 downloaded on 02 January, 2016

1188 PALMÆ PENNATIFOLIÆ.

PENNATIFOLIÆ.

CYCAS.

- circinalis.* 1. **CYCAS** frondibus pinnatis circinnalibus: foliolis planis. *Cycas frondibus pinnatis, foliolis linearilanceolatis, stipitibus spinosis. Hort. cliff. 482. Fl. zeyl. 393. Roy. lugab. 5.*
Palma indica, caudice in annulos protuberante distincto. *Raj hist. 1360.*
Arbor Zagoë amboinensis. *Seb. zbej. 1. p. 39, t. 25. f. 1.*
Tessio. *Kämpf. jap. 897.*
Olus calappoides *Rumpf. amb. 1. p. 86. t. 22. 23.*
Tōdda-paua f. Mouta-panna. *Rheed. mal. 3. p. 9. t. 13. -- 21.*
Habitat in India.
Foliatio circinalis more Filicum peragitur.

COCOS.

- nucifera.* 1. **COCOS** frondibus pinnatis: foliolis replicatis. *Coccus frondibus pinnatis: foliolis ensiformibus margine villosis. Hort. cliff. 483. Fl. zeyl. 391. Roy. lugab. 4.*
Palma indica coccofera angulosa. *Baub. pin. 502.*
Palma indica nucifera. *Baub. hist. 1. p. 375.*
Calappa. *Rumpf. 1. p. 1. t. 1. 2.*
Tenga. *Rheed. mal. 1. p. 1. t. 1. 2. 3. 4.*
Habitat in India paludosis, umbrasis.
Foliola omnia (excepto utrinque infimo) retro-plicata sunt, contra ac in sequente.

PHOENIX.

- dactylifera.* 1. **PHOENIX** frondibus pinnatis: foliolis complicatis. *Phoenix frondibus pinnatis: foliolis alternis ensiformibus basi complicatis, stipitibus compressis dorso rotundatis. Hort. cliff. 482. Hort. upj. 306. F. zeyl. 390. Roy. lugab. 5.*
Palma major. *Baub. pin. 506.*
Palma dactylifera major vulgaris. *Sloan. jam. 174.*
Palma. *Baub. hist. 1. p. 351. Dod. pempt. 819. Raj. hist. 1352.*
Palma hortensis mas. | Palma hortensis femina.
Kämpf. amœn. 688. t. 1. | Kämpf. exot. 668. 686.
1. 2. f. 1. 2. | t. 1. 2. f. 2. 16. 11.
Habitat in India.

ARE-

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