

# WILD POPULATIONS OF *ARECA* AND *COCOS* IN ANDAMAN AND NICOBAR ISLANDS

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## Abstract

Natural populations of Arecanut (*Areca catechu* L.) and Coconut (*Cocos nucifera* L.) were observed in Nicobar Islands and *Areca triandra* Roxb. in Andaman Islands. Both Arecanut and Coconut populations show extreme variability in morphological characters which are tabulated and illustrated. Literature on the original home of these crops are reviewed. It is suggested that Nicobar Islands possibly form part of the original home of both Arecanut and Coconut shared by other SE. Asian regions and Indo-Pacific regions respectively.

The Andaman and Nicobar Archipelago situated in Bay of Bengal lies in an arched string of about 319 big and small islands stretching from Burma in the north to Sumatra in the south between 6° and 14°N latitudes and 92° and 94°E longitudes (Fig. 1). The northernmost Landfall Island is situated at about 190 km from Cape Negrais of Burma and the southernmost Great Nicobar Island at about 150 km from Banda Aceh of Sumatra. The Andaman group of islands from Landfall Island to Little Andaman stretches about 464 km in length and has a maximum width of about 51 km (average width being 24 km) and occupies an area of about 6340 sq. km. The Nicobar group from northernmost Car Nicobar to Great Nicobar Island stretches about 293 km on length and has a maximum width of 57 km and occupies an area of about 1953 sq. km. These two groups are separated by the 10°N. latitude channel with a width of 155 km from Little Andaman to Car Nicobar Island. The Andaman group consists of about 291 islands and the major islands are North, Middle and South Andamans and Little

Andamans with two outlying volcanic islands, the Barren and Narcondum in Andaman sea. The Nicobar Islands consist of about 28 islands and the major islands are Car Nicobar, Teressa, Katchal, Kamorta, Nancowry, Little Nicobar and Great Nicobar. These islands form visible peaks of a continuous hill range or two hill ranges, forming a continuous extension of the Arrakkan Yoma range of Burma, connecting to Barisan of Sumatra.

The terrain is generally hilly with large number of spurs and ridges enclosing narrow valleys. Flat lands are comparatively scarce. The highest peak in Andaman group is the Saddle Peak having an altitude of 720 m above m.s.l. and in the Nicobar group the highest peak is Mt. Thuiller with an altitude of about 670 m above m.s.l. The soils are immature, loose in texture, poor in drainage, low in moisture retaining capacity. Mostly they are made up of mainly sandstones, shales and limestones and vary from clay to clayey loams, gravelly loams to sandy loams and alluvial soil. The islands of Nicobar group are mostly surrounded by coral reefs and shallow seas

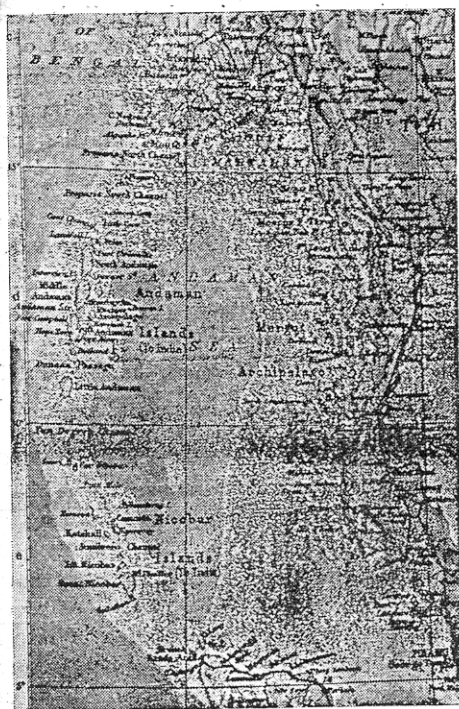


Fig. 1. Andaman & Nicobar Islands with neighbouring land areas and contour of sea.

with long stretches of sandy beaches. Car Nicobar and most of Katchal islands are almost flat, while the other islands like Kamorta, Nancowry, Little Nicobar and Great Nicobar are hilly.

These islands show a uniform tropical warm humid climate with the temperature ranging from  $22^{\circ}\text{C}$  to  $32^{\circ}\text{C}$  and the mean relative humidity of about 82%. Average annual rainfall ranges from about 300 cm in the north to about 380 cm in the south and the main precipitation occurs during southwest and northeast monsoons from April to December. These islands are subject to cyclonic winds and gales, usually common with the change of monsoons and sudden depressions in the seas

around. The months of January to March show fairly dry weather.

The tropical humid climate facilitates rich luxuriant vegetation in all the islands very similar to SE Asian countries. Of the total geographical area of 8293 sq. km, about 70% are under rich tropical evergreen and semievergreen forests. Most of the islands being uninhabited except the 38 large islands, the flora still remains virgin and undisturbed by any anthropogenic activities for millions of years. The vegetation of these islands can be broadly classified as tropical evergreen with minor local variations from north to south depending upon amount of rainfall, type of soil and capacity of soil to hold moisture. The knowledge on the flora of these islands still remains inadequate. Except for sporadic collection trips to some of the approachable islands during the past by various British botanists and forest officers like Kurz, Helfer, King, Prain, Parkinson, Rogers, etc. very little botanical studies have been undertaken in these islands. The recent intensive surveys have facilitated deeper studies into the unexplored and underexplored regions of the islands resulting in the accumulation of several interesting data and many new species and records.

The insular nature of this territory, being physically isolated from mainland through millions of years and the early separation of Andaman group from Nicobar group, have resulted in the development of a peculiar flora showing multidimensional affinities to neighbouring regions coupled with distinct elements of their own. While about 25% of the flora show widespread distribution in all adjacent regions like NE India, Burma, Thailand, Malaysia and Indonesia, about 20% show distribution extending only to NE India, Burma and Thailand. The most interesting group is the 45% of the flora showing distribution to Malaysia and Indonesia only and about 10%

of the flora are endemic to these islands. Thus the flora of these islands are undoubtedly 'subcontinental' evolved to their present state from a completely balanced continental flora, and got improved by gradual extinction of many species supplemented by the establishment of occasional new species and new introductions. The flora of Andaman group show distinct dissimilarities from the flora of Nicobar group as many genera and species occurring in the former are not found in the latter and vice versa.

The early inhabitants of these islands constitute two ethnic groups, the Negrito tribals of Andaman group and the Mongoloid tribals of Nicobar group. The Negrito tribals show close similarities with SE Asian negritos and consist of 4 groups, each showing distinctive features and speak dissimilar dialects. The Jarawas with an approximate population of about 250 people occupy the western parts of Middle and South Andamans. They are hostile to outsiders and still remain isolated from outside world. The Sentinelese with an approximate population of about 100 people live isolated in North Sentinel Island. They are also hostile to outsiders and had no contact with civilisation so far. The Onges with a population of 112 people occupy the Little Andaman Island. They are friendly and of late are slowly picking up the benefits of civilisation. The Andamanese aboriginals who once occupied and dominated these islands are on the verge of extinction having only 24 people and are living under Government protection in Strait Island. The Nicobar Islands are occupied by two tribals, the Nicobarese and Shompens. The Nicobarese are the most advanced and form the major group with about 18000 people and are spread over most of the islands in Nicobars. The Shompens with only about 92 people are confined to the interior of Great Nicobar Island and are still shy of outsiders.

It is not known when these tribals reached these islands. Even the earliest record of these islands by Ptolemy, soon after the commencement of the Christian era mentions the inhabitants of these islands as cannibals, calling these islands as the "Angdaman Islands" (Kloss, 1902). However, the point of interest to the subject of this paper is that they have occupied these islands for thousands of years and still live in a primitive state of civilisation and do not practice any cultivation methods. They are all food gatherers, collecting *Pandanus* fruits, tubers, Bananas, honey, etc. from forests, catching fish and hunting wild pigs. The Nicobarese even though comparatively better civilised still do not practice any significant cultivation, even though E. H. Man and Dampier (17th Century) and Koenig (18th Century), all quoted by Kloss (1902) talk of cultivation of tubers, fruit trees and plantations of coconut. The wild populations of coconut in Nicobars do have an appearance of plantations for a casual observer. However careful observations show that they are naturally regenerating and the islanders do not take any care in their propagation. They depend on the abundantly available coconut and *Pandanus* fruits and also keep domesticated pigs and fowl. Both the Nicobarese and Shompens are addicted to chewing betel leaf (*Piper betel*) with betel nut (*Arecanum*) and lime, even in early childhood. However the Negrito tribals of Andamans are not addicted to chewing and the habit seen nowadays among them seems to be a recent acquisition. However they are known to eat fruits of *Arecanum* without betel leaf and lime.

With this background in view it is interesting to study the occurrence of wild populations of *Arecanum catechu*, *A. triandra* and *Coscinus nucifera* in Andaman and Nicobar Islands.

The genus *Arecanum* with about 43 species widely distributed in India, Sri Lanka, Bangladesh, Burma, Indo-China, Thailand, Malaysia

Indonesia, Philippines to Fiji Islands and east coast of Australia (Furtado, 1933). Among these species only two species occur in these islands, i. e. *Areca catechu* and *Areca triandra* (Parkinson, 1923).

1. *Areca catechu* L. This is the common widely cultivated betel nut palm, the seeds of which are used extensively in South and Southeast Asian countries as masticatory in combination with betel leaf and lime, and often tobacco. This is one of the hexandrous species of *Areca* so far known only under cultivation and never in wild state. The native home of this species is still controversial. Ridley (1930) states that this palm is not known in wild state but is probably Malaysian in origin. De Candolle (1886) while reviewing the origin agrees with Martius (1823-1850) that the country of origin is not proved. Early botanists like Roxburgh (1832), and Bretschneider (1894-95) have proposed different regions of SE. Asia including Malay Peninsula, Sumatra, Moluccas, Philippines and Indo-China. According to Watt (1892) the native home of *Areca catechu* is Cochinchina (Vietnam), Malaya, and Malayan Islands. Tanaka (1976) also states that it is a native of tropical Asia, especially Malaysia. However this species is not known in wild state anywhere in these regions. Every flora of SE. Asian countries, i. e. Burma (Kurz, 1877), India (Hooker, 1894), Ceylon (Trimen, 1898), Malaya (Ridley, 1925) and Java (Backer and Bakhuizen, 1968) reports that this species is seen only in cultivation. To quote Ridley (1925), "I have never seen it wild, nor does it appear to establish outside cultivated ground". Ridley (1930) further states "I believe the palm is not known in a wild state anywhere and, commonly cultivated as it is, I have never seen any plant which seemed to have escaped from gardens, except a few germinating seeds brought down by a stream". Beccari (1919) reporting a personal communication from Merrill on a specimen collected from primeval forests of Palawan in Philippines quotes, "I strongly

suspect that the trees I found in this place originated from seeds accidentally left there by natives". However Backer & Bakhuizen (1968) add a reference to Koorders who suggests that *Areca catechu* is possibly wild in E. Java. They also describe *A. catechu* growing luxuriantly as natural forests behind beach creeks, etc., all lowland areas.

In view of these statements by all authors so far, it is interesting to note that the present authors have seen *A. catechu* in wild state at various places in Nicobar Islands particularly in Great Nicobar, Katchal and Car Nicobar Islands. Recent exploration trips to these islands have shown that this species grows abundantly in several vast areas along lowland forests behind beach forests and along borders of creeks and mangrove forests, in sandy soil rich in moisture (see Fig. 2). They grow luxuriantly as natural forests associated with *Pandanus*, *Barringtonia*, *Ficus*, *Heritiera*, *Dysoxylum*, etc. regenerating naturally by germination of fallen nuts. Kurz (1876) states that *Areca catechu* is "wild in the tropical forests of Kamorta and apparently also in the Coral reef forests of Katchall; otherwise everywhere cultivated and like wild". Kloss (1902) in his interesting account on an expedition to these islands makes a significant statement about the flora of Great Nicobar, "A mango-steen (*Garcinia* sp.) and a cinnamon (*Cinnamomum obtusifolium*) grow wild, as do the pepper vine (*Piper betel*) that supplies sireh leaf and the betel palm (*Areca catechu*)". He further adds a sentence expressing doubt over the indigenous nature of *Piper betel* and *Areca catechu*. "These two are also cultivated and it is said that the latter is not indigenous". However it is inconceivable that such large populations of *Areca catechu* could occur as relicts of cultivation in primary forests far away from human habitations. There are two possibilities which would explain the situation.

(1) The species introduced into these islands by early aboriginal immigrants has now run wild and occur in large natural populations.

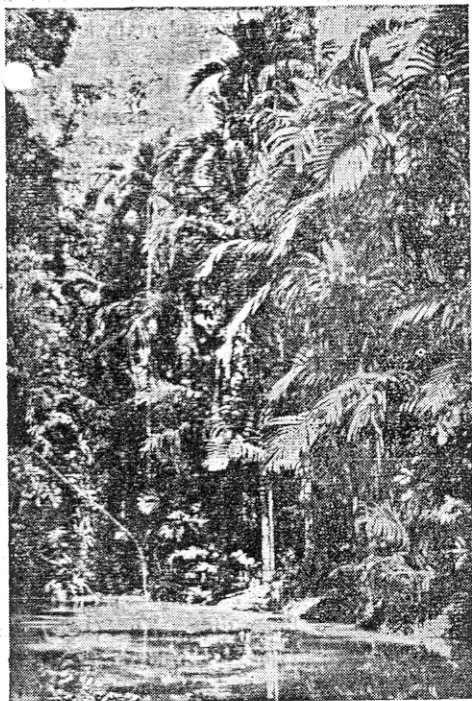


Fig. 2. *Areca catechu* in wild natural populations in Car Nicobar.

(2) The Nicobar Islands form part of the original home of *Areca catechu* now remaining as a relict wild population after having disappeared from wild state in other areas of SE. Asia including Malaysia and Indonesia.

Considering the first possibility, the two aboriginal tribals, the Shompens and Nicobarese occupying these islands since time immemorial are addicted to chewing betel nut with betel leaf (the latter also grows wild in these islands), and the abundantly available lime of coastal areas. Is it possible that these tribal people brought betel nuts and betel vines from other SE. Asian countries for cultivation and later permitted them to spread wild into the forests? There are several points which contradict this possibility. First of all both

these tribals do not practice any sort of cultivation. Whatever minor cultivation of coconuts, vegetables, tapioca, etc. found in these islands are recently acquired practices due to contact with outsiders and that too near their homesteads. Therefore it is impossible that they could have brought these plants with the intention of propagating them. Is it then possible that they have brought these plants in the form of nuts and cutting of betel vines which accidentally got established and spread wild? If this is so then why *Areca catechu* and *Piper betel* ran wild in these islands and did not do so in other SE. Asian countries, i.e. Peninsular India, Sri Lanka, Thailand and Malaysia where they are widely cultivated?

Considering the second possibility that Nicobar Islands form part of the original home of *Areca catechu*, there are several points supporting it. Firstly these islands were connected with mainland Burma and Indonesia during the early part of Tertiary when angiosperms including palms were well established on the face of earth. It is also possible that during the Ice Ages, when sea level was much lower, there were land connections between these islands and mainland. Hence, if *Areca catechu* originated in any of these SE. Asian countries it could have easily spread to Nicobar Islands. Extensive botanical explorations of SE. Asian countries have not so far shown any large wild populations of Arecanut, except a few doubtful ones at a few places in E. Java and N. Celebes. How these wild populations disappeared from these countries and how they still remain as relicts in Nicobar Islands would remain a mystery for a long time to come unless and until sufficient fossil evidences are obtained.

Further the amount of variability exhibited by Arecanut palms growing in Nicobar Islands is unparalleled in any other areas of cultivation in the world. The nuts of the palms growing in these islands show extreme variations in

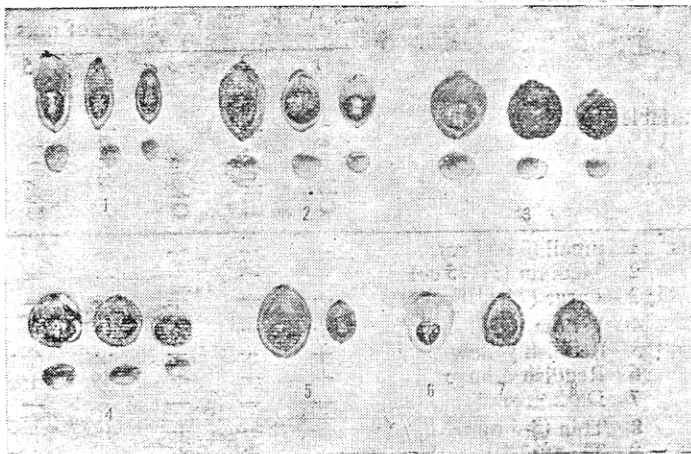


Fig 3 Variations in nuts of *Areca catechu*. (1) Oblong nuts (large, medium and small, with kernels below), (2) Ellipsoid, (3) Ovoid, (4) Spherical, (5) Largest and Smallest nuts, (6) Thick-husked conical, (7) Obconical, section view, (8) Obconical, outer view.

size, shape, colour, thickness of husk, thickness and shape of kernel and yield, as tabulated in Table I and shown in Fig. 3. Beccari (1919) reports some varieties of *Areca catechu* from Philippines based on the shape of fruits and size of palms. However these are not in any way comparable to the large amount of variations shown by Nicobar plants. Moreover most of those varieties are from cultivation or from relicts of cultivation in abandoned human settlements. Such variations could not have originated a few nuts brought and run wild. When people bring nuts for cultivation naturally they would usually bring only the good varieties. Therefore, the presence of such varieties which do not have any significant utility show that these populations here are long standing and original allowing them to produce extreme genetic recombinations resulting in a multitude of phenotypic variations. Further it is also interesting to note that though several insects are known associated with Arecanuts of these islands, no major destructive pests and diseases which usually

infect cultivated plantations elsewhere are found in these islands. Probably this explains why these original populations did not disappear from these islands and still survive. It is also significant that no wild populations of *Arecanut* are found in Andaman group of islands and all palms seen there are being cultivated by settlers during the current century. Therefore it is possible that the wild populations of *Areca catechu* now found in Nicobar Islands are relicts of original natural populations which once extended probably throughout southern regions of SE. Asia including Philippines, Malaysia and Indonesia.

2. *Areca triandra* Roxb. This is a triandrous close relative of the hexandrous *A. catechu* both having the same chromosome number of  $n=16$  (Bavappa and Raman, 1965). The trees have shorter and thinner trunks than *A. catechu*. The nuts are smaller and contain the same properties as *Arecanut* and is often used as a substitute for it. In most of the islands of Andaman group they grow in

Table 1. Phenotypic variability in Arecanut palms of Nicobar Islands

Variable attributes			Shape of nuts						
			1	2	3	4	5	6	7
			Oblong	Ellipsoid	Ovoid	Spherical	Conical	Obconical	Squarish
I	Size of nuts	1 Small (28-50 cc)	+	+	+	+	-	-	-
		2 Medium (51-75 cc)	+	+	+	+	+	+	-
		3 Large (76-110 cc)	+	+	+	-	-	-	-
II	Colour of nuts	4 Yellow	+	+	+	-	+	+	-
		5 Reddish yellow	+	+	+	+	+	+	-
		6 Reddish orange	+	+	+	+	+	+	+
		7 Dark green*	-	-	-	+	-	-	-
III	Thickness of husk	8 Thin (3-6 mm)	+	+	+	+	+	+	-
		9 Thick (7-10 mm)	+	+	+	+	+	+	+
IV	Weight of kernel	10 Low (4-7 gm)	-	+	+	+	-	-	-
		11 Medium (8-10 gm)	+	+	+	+	+	+	+
		12 High (11-13 gm)	-	-	-	+	-	-	-
		13 Super (above 13 gm)	-	-	+	-	-	-	-
V	Yield per year	14 Low (100-200) numbers	+	+	+	+	+	+	+
		15 Medium (201-500)	+	+	+	+	+	+	+
		16 High (501-800)	+	+	+	+	+	+	-
		17 Super (above 800)†	+	+	+	+	+	+	-

\* Such palms producing dark green nuts which seldom show a slight reddish tinge even when fully mature is not found anywhere else in the world.

† Some types produce as much as 2000 nuts per year but the yield is only in alternate years.

scattered wild populations in inland hill forests (Fig. 4). This species is also known to occur wild in Bangla Desh, Assam, Burma, Thailand and Malaysia (Kurz, 1877; Hooker, 1894; Parkinson, 1923). Roxburgh (1832) states that this species is native of Chittagong in Bangla Desh. Tanaka (1976) records Andaman Islands as its native home. An interesting point to be considered here is while *A. catechu* grows wild in Nicobar Islands and not in Andaman Islands where it is cultivated, *A. triandra* grows wild in Andaman Islands and is not found in any of the islands of Nicobar group. Why this species is absent in Nicobar Islands while it is distributed in all the surrounding regions towards north? One palusible explanation seems to be that in Nicobar

Islands *A. triandra* is replaced by *A. catechu* both probably having originated from the same ancestral stock of an extinct species which was widespread in SE. Asia and from which *A. triandra* originated somewhere in northern territories of Andamans, Bangla Desh, Assam, Burma and Thailand and *A. catechu* somewhere in southern territories of Nicobars, Indonesia and Philippines, both had having no opportunity to extend into the areas of each other.

3. *Cocos nucifera* L. The coconut palm of the monotypic genus *Cocos* is widely cultivated in tropical regions of both Old and New World. Considerable controversy exists as to the original home of coconuts. The occurrence of several other species of *Cocos* in

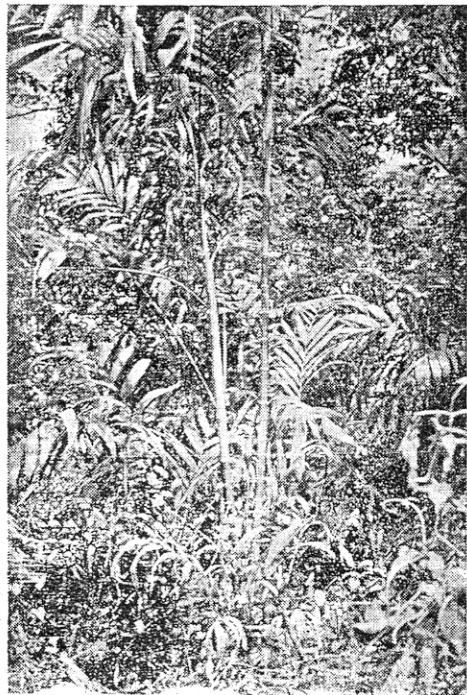


Fig., 4. *Areca triandra* populations.

Neotropics led many botanists to suggest American region. Heyerdahl (1950) after his famous *Kon-Tiki* expedition crossing on Balsa raft from S. America to Polynesia suggested that early migrants from S. America brought coconuts with them to Polynesia. However Merrill (1954) has reservations on this theory. All New World species of *Cocos* have now been transferred to different genera, leaving *Cocos* with the solitary species *Cocos nucifera* as proposed by Beccari (1916) and later confirmed by anatomical evidences given by Tomlinson (1961). According to Tanaka (1976) and several earlier authors like Menon & Pandalai (1960), Patel (1938), Hill (1929), Beccari (1916), Watt (1892) and Martius (1823-50) coconut might have originated in any one of the places in SE. Asia from Malaysia to Mela-

nesia. De Candolle (1884) traced its origin to Dutch East Indies. According to Baker (1970) the coconut palm may actually be more closely related to the palms of Indian Ocean than to New World's native palms. Child (1954) suggests Melanesia from New Guinea to Fiji as the original home. While according to Vavilov (1926) and Darlington (1956) the centre of origin of coconut lies in the belt from Thailand to Malaysia and Java. Purselglove (1968) opines that Melanesia where large amount of variations are noticed has more right to claim this distinction. Review of recent literature indicate that there is now general agreement that coconut originated somewhere in Indo-Pacific region and probably was once widespread in the ancient Gondwanaland as indicated by Tertiary fossils in Rajasthan, India (Kaul, 1951), New Zealand and Marianas in Pacific (Corner, 1966). There is sufficient evidence that coconuts were used by people in India at least 3000 years ago during Vedic period (Hill, 1929), even though no wild populations are now seen in mainland India. Sauer (1971) believes that coconut is a native member of the cosmopolitan Indo-Pacific strand flora and that its transpacific distribution is not a reliable evidence of human dispersal.

An interesting piece of evidence indicating the centre of origin of coconut is the association of a large Crab called Robber Crab (*Birgus latro* L.) with coconut palms in many Pacific and Indian Ocean Islands including South Sentinel Island of Andamans. It was believed that these crabs feed upon fallen coconuts after hammering open the shell with their claws, even though there was no authentic report of such fantastic performance. However it is known that these crabs climb coconut trees and cut the pedicels allowing the nuts to fall down and probably in the process breaking open some of them by the impact. It is also seen that they not only feed upon the kernel but also shred the husk into fine wool

which they use for lining the burrows in which they live. The strength these animals can be visualised by the studies made by Davis & Aevogt (1976) on these crabs of South Sentinel Island recently. They found that an adult could lift even a load of 28 kg and pull a weight of 30 kg and hang on when its legs were tied to a weight of 5 kg. While Beccari (1917) points out that the association of Robber Crab with coconut is an evidence of its origin in Indo-Pacific region, Reyne (1939) thinks that the relationship is purely incidental. Child (1953) states that the chemical examination of the crab's fat revealed that it closely resembles coconut oil while it had very little affinity towards animal fat. As stated by Baker (1970) it is inconceivable that such a high degree of specialisation could be reached quickly and as a consequence the distribution of the crab gives a minimal estimate of the range of coconut palm before man began to move it around. Purseglove (1968) also states that the Crab does not occur in islands where there are no coconuts.

Now coming to reports of wild populations of coconuts, it is interesting to recall the statements of early botanical explorers of these islands. Kurz (1877) states that *Cocos nucifera* grows wild in Great Cocos Islands, a group of few islands in Burmese territory situated north of Landfall Island, the northernmost of the Andaman group and south of Cape Negrais of Burma. Prain (1890) states that *Cocos nucifera* is indigenous on the Cocos Islands but not in Andaman Islands, and his study does not include Nicobar Islands. Beccari (1917) reports that wild populations of *Cocos nucifera* occur in the uninhabited Palmyra Islands of Pacific associated with Robber Crab. According to him human assistance is not necessary for propagation in regions where their existence is not disputed by nature of soil or by other pre-existing vegetation or by foes of other

kinds. Backer & Bakhuizen (1968) refers to Koorders suggesting *Cocos* as frequently naturalised and occurring possibly wild in E. Java. These are the only statements seen in literature about wild populations of *Cocos nucifera* as every other SE. Asian flora (cited under *Areca catechu*) reports that coconut is seen only under cultivation. Cook (1902) even states that nowhere could a coconut palm be found self-established on a sea shore, arguing against natural floatation and establishment in different islands. However it must be added that coconut was one of the early colonizers on the Anak Krakatau IV, a new volcanic island of Indonesia after it emerged from sea in the year 1930 (van Leeuwen, 1933). According to Nayar (1977) it is necessary to carry out thorough exploration of the tropical American forests particularly and also the Melanesian and Far Eastern regions for the presence of naturally occurring and less evolved forms of coconut.

In view of these statements it is interesting to note that coconut grows in wild populations unattended by any human assistance in several islands of Nicobars including Car, Nicobar, Teressa, Tillangchong, Katchal, Kamorta, Little Nicobar and also the uninhabited South Sentinel Island where Robber Crabs live. Wild populations of coconut are absent in other islands of Andaman group where they are seen only in cultivation, except the Great Cocos Island of Burma, mentioned earlier.

An interesting and significant peculiarity exhibited by the coconut palms of these islands are the innumerable variations as listed below under Table 2 and Fig. 5. The coconut palms are generally classified into two major groups, the Tall and Dwarf varieties, and both occurring in these islands. The Tall palms are usually cross-pollinated and the Dwarf palms mainly self-pollinated, especially the Dwarf yellow which breeds true (Grimwood, 1975). Within these two major varieties the Nicobar palms show innumerable variations as to size,

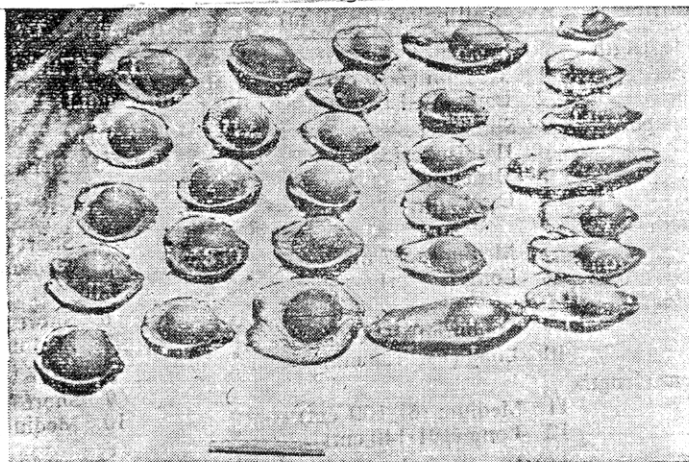


Fig. 5. Variation in coconuts of Andaman and Nicobar Islands showing longest, smallest, thick husked, thin husked and different shapes.

shape and colour of nuts, length of internode, length of leaf, length of leaflet, shape of crown, inflorescence length and either branched or not, thickness of husk, thickness of kernel, weight of copra, glucose and oil content, yield per year, and abnormalities like horned nuts and palms bearing only barren nuts, etc. These variations are permuted and combined multidimensionally, so that in natural populations the actual amount of variations amount to hundreds. The recorded cultivars so far known around the world amount to only 55 (Satyabalan, 1974), all known only under cultivation. However an FAO report (1970) shows 80 different varieties recorded from different parts of the world, many of which are 'ecological types' having evolved as a result of adaptation to certain environment. A few peculiar types seen in Nicobar Islands are the longest spicate inflorescence recorded in the world measuring 175 cm. An abnormal type producing only horned nuts consistently in all bunches is known from these islands (Nair, 1976). Such horned nuts are usually freaks occurring rarely in one or two nuts in

palms under cultivation elsewhere, whereas the few palms seen here consistently produce such nuts. The Dwarf yellow palms seen in these islands are indigenous and not found anywhere else in the world. There are also many palms here which produce only empty anthers and barren nuts indicating genetic defect. One of the longest nuts known so far in the world, measuring 36 cm is from these islands, so also the smallest nut measuring about 10 cm. There are many palms producing large bunches of only micronuts and yielding a maximum of 700 nuts per year (Fig. 6). Often these palms produce only in alternate years. There are also several palms which produce large number of inflorescences with male and female flowers on heavy crowns but do not produce any fruits. Another peculiar type seen in these islands are beaked fruits showing all variations in thickness and shape of beaks, which consistently produce such fruits. A peculiar lanceolate type of fruits are also seen in these islands.

When the known cultivars throughout the world comes to only about 50-80 types, it is

Table 2. Phenotypic variability in Coconut Palms of Nicobar Islands

Variable attributes	Tall palms ( $\pm 10$ m)	Dwarf palms ( $\pm 5$ m)
Internode length	1 Medium (7-10 cm)	1 Short (3-7 cm)
	2 Long (10-13 cm)	2 Medium (7-10 cm)
II Crown shape	3 Spherical	
	4 Hemispherical	
	5 Drooping	3 Hemispherical
	6 Erect	
III Leaf length	7 Medium (5-7 m)	4 Short (3-5 m)
	8 Long (7-9 m)	5 Medium (5-7 m)
IV Leaflet length	9 Medium (110-130 cm)	6 Short (95-110 cm)
	10 Long (130-150 cm)	7 Medium (110-130 cm)
V Inflorescence length	11 Medium (61-100 cm)	8 Long (130-150 cm)
	12 Long (101-140 cm)	9 Short (40-60 cm)
VI Inflorescence type	13 Spicate	10 Medium (61-100cm)
	14 Paniculate	
VII Fruit colour	15 Greenish	11 Paniculate
	16 Yellowish	12 Greenish
	17 Reddish	13 Yellowish
		14 Reddish
VIII Fruit shape	18 Elongated	
	19 Ellipsoid	
	20 Conical	15 Ellipsoid
	21 Ovoid	
	22 Obovoid	16 Ovoid
	23 Oblong	
	24 Spherical	
	25 Trigonous	17 Spherical
	26 Beaked	
	27 Lanceolate	
IX Fruits size (unhusked)	28 Micro (600-2000 cc)	
	29 Small (2001-4000 cc)	18 Small (2001-4000 cc)
	30 Medium (4001-6000 cc)	19 Medium (4001-6000 cc)
X Husk thickness	31 Giant (6000-8220 cc)	
	32 Thin (1-3 cm)	20 Thin (1-3 cm)
XI Nut size (husked)	33 Thick (3-6 cm)	
	34 Micro 300-500 cc)	
	35 Small (501-1000 cc)	
	36 Medium (1001-1500 cc)	21 Small (501-1000 cc)
	37 Giant (1501-2175 cc)	22 Medium (1001-1500 cc)
XII Kernel thickness	38 Thin (0.9-1.2 cm)	
	39 Thick (1.3-1.6 cm)	23 Thin (0.9-1.2 cm)
XIII Copra weight	40 Low (80-100 gm)	24 Low (80-100 gm)
	48 Small (101-200 gm)	25 Small (101-175 gm)*
	42 Medium (201-300 gm)	26 Medium (176-250 gm)*
	43 High (301-400 gm)	
	44 Super (400-450 gm)	

Variable attribute	Tall palms ( $\pm 10$ m)	Dwarf palms ( $\pm 5$ m)
XIV Glucose content	45 Low (2.4-3.0%)	
	46 Medium (3.1-5.0%)	27 Medium (3.1-3.6%)
	47 High (5.1-6.2%)	
XV Oil content	48 Low (65-70%)	28 Low (65-70%)
	49 High (71-75%)	
XVI Yield per palm per year	50 Poor (0-25 nuts)	
	51 Low (26-50 nuts)	29 Low (26-50 nuts)
	52 Medium (51-125 nuts)	30 Medium (51-125 nuts)
	53 High (126-200 nuts)	
XVII Abnormalities	54 Super (above 201 nuts)	
	55 Horned nuts only	
	56 Barren nuts only	
	57 Leaflets united together	

\*The low weight of copta in Dwarf palms is due to the thin nature of kernel.

very significant that these small islands with an area of only 1953 sq. km. should contain such innumerable variable types. The occurrence of wild populations of coconut regenerating naturally without any help from human agency, the association of Robber Crab and the occurrence of a very large number of phenotypic variations indicate that Andaman and Nicobar Islands including Great Cocos Island possibly constitute part of the original Indo-Pacific homeland of coconut. The fact that coconut palms of these islands though showing association with many insects and termites, are not infested with any of the major destructive pests and diseases, which usually affect the plantations elsewhere in the world, is probably the reason why the wild populations with a multitude of variations survived so long, while they have disappeared and have been replaced by cultivated palms in other parts of SE. Asia. The exact place where it originated in the region would have to remain a mystery for ever.

An important point which needs mention here is the recent large scale deforestation taking place in these islands for developmental activities. Such encroachment into the virgin forests are reducing the wild populations particularly *Areca catechu* and *A. triandra* and

thus depriving future research workers valuable germplasm materials. Unless protective



Fig. 6. Andaman Micro palm producing largest number of nuts.

measures are taken immediately these wild populations will soon disappear and future generations will be deprived of even the benefits of observing them in wild condition.

Conclusions : (1) Nicobar Islands possibly form part of the original home of *Areca catechu* shared by other SE. Asian countries like Malaysia, Indonesia and Philippines. This species and the related *Areca triandra* probably evolved from a common extinct ancestral species.

(2) Andaman and Nicobar Islands possibly constitute part of the original Indo-Pacific home of *Cocos nucifera* and still retains the original ancient wild populations exhibiting extreme phenotypic and by inference genetic variability.

(3) It is suggested that further research on the genetic variability of both *Areca* and *Cocos* populations in Nicobar Islands should be carried out to throw more light on the true status of these populations.

(4) Immediate measures should be taken to protect these populations from human interference and destruction.

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## F. R. I. News and Notes

### F.R.I. participates in India International Trade Fair 1979

In the Agriculture Pavilion "New Directions of Agriculture" set up by the Directorate of Extension, Ministry of Agriculture and Irrigation, the Forest Research Institute has organised a Forestry stall at the India International Trade Fair being held from Nov. 10 to Dec. 9, 1979. The Forestry stall depicts the status of forestry and its vital contribution to the development of trade and industry.

Among other important exhibits are one and two roomed Pre-fab. Timber Houses designed and developed by the Timber Engineering Branch and the Solar Heated Timber Seasoning Kiln designed by the Wood Seasoning Branch.

### All India Forestry Conference

The All India Forestry Conference will be held at Forest Research Institute, Dehra Dun from 16th to 19th January, 1980.

The Golden Jubilee Wedding Anniversary of Smt & Prof. M.B. Raizada was celebrated with great pomp and show. On October 1, 1979, their children hosted a lavish dinner. This was followed by an At Home on second October which was attended by over 1000 guests including several from outstation who came to wish them a long life.

Shri K.C. Shani, till recently Director of Biological Research, Forest Research Institute and Colleges, Dehra Dun has been appointed Professor of Botany, Himachal University, Solan.