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Genetic Resources of Arecanut

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1. INTRODUCTION

Arecanut, betelnut or supari the source of common masticatory is obtained from the arecanut palm *Areca catechu*. It is an essential requisite for several religious and social ceremonies in India and is extensively used by all sections of the society as a masticatory. Bhat and Rao (1962) have produced several evidences to prove the antiquity of arecanut in India.

2. ORIGIN AND DISTRIBUTION

The origin of arecanut palm has not been reliably documented and even now considerable speculation surrounds on the place of origin. The nativity has been variously attributed to Cochin China, Malay Peninsula and neighbouring islands (Watt, 1889) and East Indies (present Indonesia) (Gode, 1961). According to Blume (1836) the habitat of the arecanut palm is the Malay Peninsula, Thailand and the neighbouring islands. In "The origin of Cultivated Plants" De Candolle (1886) attributed the origin to Sunda Islands. Beccari (1919) was inclined to think that *A. catechu* evolved into specific character in the Philippines. *Areca* palm fruiting in wild state in the Attapady Forest ranges in Kerala at an altitude of 1000 meter was reported by Fisher (Blatter, 1926). Raghavan (1957) indicated that the centre of origin of *A. catechu* is likely to be around the Malay Archipelago, the Philippines and other East Indies Islands. About 24 species of *Areca* were reported to occur naturally in the contiguous area of Malay, Borneo and Celebes and based on the diversity and the wealth of forms of *Areca*, Bavappa (1963) concluded that East Indies group of Islands may be the centre of maximum variation.

In Linnaeu's *Species Plantarum* (1753), *Areca* is given the status of monospecific genus. The genus expanded rapidly from its monospecific status and is at present believed to contain about 76 species. *Areca catechu* is the only cultivated species used as a masticatory and chewed as mild stimulant though nuts of *A. triandra* Roxb. also can be chewed.

3. COLLECTIONS

3.1 Cultivars of *A. catechu*

Beccari (1919) recognised four cultivars of arecanut namely *A. catechu* var. *communis*; *A. catechu* var. *silvatica*; *A. catechu* var. *batanensis* and *A. catechu* var. *longicarpa* based on the size and shape of fruits and kernel. A new cultivar of arecanut from Mysore was described by Rau (1915) based on the sweet kernels of mature fruits and its was named as *A. catechu* var. *deliciosa*. It was customary to keep local name to *Areca* cultivars available in Malay, Sri Lanka and South India (Sands, 1926; Grist, 1926; Molegode, 1944; Nambiar, 1954; Aiyer, 1966). Raghavan and Baruah (1956) described different cultivars of *A. catechu* occurring in Assam based on variation in flowers, size and shape of fruits. Sixty-four cultivars were reported from Kerala, Karnataka and Maharashtra by Murthy and Bavappa (1962) based on fruits size and variation in relation to the topography of the tract. Bavappa (1966) stated that cultivars of arecanut could be identified based on the number of stomata per unit area. In a later study, Bavappa and Pillai (1976) found significant differences in respect of number of leaves shed, spadices and female flowers produced, fruit set, number of nuts harvested and weight and size of nuts among 13 cultivars of arecanut from 8 countries. A dwarf palm naturally occurring in Hirehalli, Karnataka, was reported by Naidu (1963), which has suppressed internodal spaces. However, the inflorescence and floral characters are similar to *A. catechu* and the nuts are medium size and elongated.

3.2 Collection at Vittal

The Regional Station of Central Plantation Crops Research Institute, Vittal, maintains a collection of cultivars of *A. catechu* and related species from within the country as well as from Sri Lanka, the Philippines, Indonesia, Singapore, Malaysia, Thailand, South China, Fiji, Solomon Islands and Mauritius. Twenty three exotic collections consisting of six species of *Areca* (Table 1) and 44 (Fig. 1) indigenous types (Table 2a and 2b) were introduced in various stages starting from 1957.

Table 1 : Details of exotic arecanut cultivars maintained at Vittal.

S.No.	Acc. No.	Country of collection	Name of species	Year of Introduction/ planting
1.	VTL-1	Fiji	*A. catechu*	1961
2.	2	Mauritius	*A. triandra*	"
3.	3	China	*A. species*	"
4.	5	Ceylon (1)	*A. species*	"
5.	6	Indonesia (1)	*A. triandra*	"
6.	7	Indonesia (2)	*A. triandra*	"
7.	9	Indonesia (4)	*A. species*	"
8.	11	Indonesia (6)	*A. catechu*	"
9.	12	Saigon (1)	*A. species*	"
10.	13	Saigon (2)	*A. species*	"
11.	14	Saigon (3)	*A. species*	"
12.	15	Ceylon (2)	*A. species*	"
13.	17	Singapore	*A. species*	"
14.	18a	Br. Sol. Islands (1)	*A. species*	"
15.	18b	Br. Sol. Islands (2)	*A. species*	"
16.	18c	Br. Sol. Islands (3)	*A. species*	"
17.	21	Ceylon (3)	*A. species*	"
18.	23	Australia	*A. normanbyii*	1964
19.	26	Fiji	*A. catechu*	"
20.	27	Saigon	*Actinorhytis calapparia*	"
21.	28a	Saigon (1)	*A. species*	"
22.	28b	Saigon (2)	*A. catechu*	"
23.	28c	Saigon (3)	*A. catechu*	"

4. EVALUATION

Sixteen exotic types among these were evaluated for yield in comparative trial for a period of 9 years and the result indicated that 5 introductions namely VTL-3 (China), VTL-11 (Indonesia), VTL-12 and 13 (Thailand) and VTL-17 (Singapore) have high yield potential and increased yield in terms of weight of nuts (Table 3). Since then VTL-3, VTL-11 and VTL-17 were released for cultivation under the name Mangala, Sumangala and Sreemangala respectively.

5. CHARACTERISATION AND DOCUMENTATION

Cataloguing of 23 exotic and 8 indigenous accessions was completed based on a descriptor using vegetative, inflorescence and fruit characters developed at CPCRI Regional Station, Vittal.

Bavappa (1974) reported the genetic divergence in 13 cultivars of *A. catechu* and four ecotypes of *A. triandra* during different years of their productive phase. He

Table 2 : Details of indigenous collections

(a) Andaman Islands

S.No.	Acc. No.	Year of introduction/planting
1.	VTL-29a	1964
2.	VTL-29b	"
3.	VTL-29c	"
4.	VTL-29d	"
5.	VTL-29e	"
6.	VTL-29f	"
7.	Local S.K.	1978
8.	Cal-1	1984
9.	Cal-2	"
10.	Cal-4	"
11.	Cal-5	"
12.	Cal-6	"
13.	Cal-7	"
14.	Cal-10	"
15.	Cal-17	"
16.	Cal-21	"
17.	Cal-27	"
18.	Cal-29	"
19.	Cal-32	"
20.	Cal-33	"
21.	Cal-35	"
22.	SCRDTC-18	"
23.	SCRDTC-43	"
24.	SCRDTC-92	"

(b) Different states

S.No.	Acc. No./Name	Sources of collection	Year of introduction/planting
1.	Sweet Areca	Karnataka	1959
2.	Mohitnagar	West Bengal	1961
3.	Mahuva-B	Gujarat	1963
4.	Hirehalli (Dwarf)	Karnataka	1963
5.	Kahikuchi	Assam	1963
6.	Kamrup	Assam	1963
7.	Mettupalayam	Tamil Nadu	1963
8.	Dapoli	Maharashtra	1964
9.	Sreevardhana-I	Maharashtra	1964
10.	Thirthahalli (Overlapping)	Karnataka	1964
11.	Sagar	Karnataka	1987
12.	Kumta	Karnataka	1987
13.	Chare (Siddapur)	Karnataka	1987
14.	Sirsi	Karnataka	1987
15.	Sreevardhana-II	Maharashtra	1987
16.	Thirthahalli (Oblong)	Karnataka	1987
17.	MN/Germ/88-1	West Bengal	1990
18.	MN/Germ/88-2	West Bengal	1990
19.	MN/Germ/88-3	West Bengal	1990
20.	MN/Germ/88-4	West Bengal	1990

Table 3 : Yield (weight of nuts) of 16 exotic introductions of *A. catechu*.

Name of the type	Accession number	1964-1965 to 1972-1973 (Average for 9 years)	Percentage of increase (+) or decrease (–) over Local
		Wet weight of nuts per tree in kg.	
Fiji	VTL-1	3.1	–68.0
Mauritius	VTL-2	6.1	–37.1
China	VTL-3	10.3	+6.2
Ceylon	VTL-5	6.9	–28.9
Indonesia-1	VTL-6	1.4	–85.6
Indonesia-2	VTL-7	8.2	–15.5
Ceylon-2	VTL-15	6.7	–30.9
Indonesia-6	VTL-11	14.5	+49.5
Saigon-1	VTL-12	12.9	+33.0
Saigon-2	VTL-13	11.7	+20.6
Saigon –3	VTL-14	9.0	–7.2
Singapore	VTL-17	14.6	+50.5
Solomon Islands-1	VTL-18a	2.7	–72.2
Solomon Islands-2	VTL-18b	5.1	–47.4
Solomon Islands-3	VTL-18c	3.2	–67.0
Ceylon-3	VTL-21	2.6	–73.2
South Kanara (control)	—	9.7	—
S.E. per plot	3.9		
Overall mean	7.6		
C.V. (%)	52.0		
C.D. (P = 0.05)	4.5		

grouped these cultivars and ecotypes from nine countries into six clusters. Based on the analysis Bavappa (1974) concluded that detection of the genetic divergence in the early years of productive stage is of considerable advantage in formulating breeding programme. The results also revealed the importance of nut and kernel characters in differentiation within *A. catechu* cultivars and between *A. catechu* and *A. triandra* types. The clustering pattern of cultivars and ecotypes revealed that geographic diversity need not always be related to genetic diversity.

In addition to the yield evaluation, the available germplasm accessions are being screened against yellow leaf disease of arecanut by locating tolerance/resistance. Thirteen different experiments are in progress at Palode, Kannara and Vittal involving all the accessions to identify disease tolerant genotypes. Among the exotic types and species screened so far, only two palms (Indonesia-II and British Solomon Island-I) have remained free from the disease (Anonymous, 1988).

6. PRIORITY AREAS FOR COLLECTION

One of the main production constraints being faced by the arecanut industry is the devastating yellow leaf disease which is prevalent in the entire Kerala State and five arecanut growing districts of Karnataka. None of the available cultivars have shown tolerance to the yellow leaf disease. There is urgent need for enrichment of the arecanut germplasm to identify disease tolerant genotypes. Priority areas for collection are South Pacific Ocean Islands and Nigeria. Within the country the areas for survey and collection are North Eastern Region, Kerala (Attapadi Ranges), Gujarat, West Bengal, Andhra Pradesh and Orissa.

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