

# **Training Fijian researchers to the editing of coconut germplasm catalogues**

Report on the mission  
at the Taveuni Coconut Centre, Fiji,  
of a CIRAD Coconut Breeder  
from January 20<sup>th</sup> to 31<sup>st</sup> 2001



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## **Acknowledgements**

I would like to warmly thank all the staff of the Taveuni coconut Centre, who welcomed me for my first mission on this beautiful island. In particular, Mr. Tevita Kete, the director of the centre, and Mr. Vijendra Kumar, a coconut researcher, contributed to the planning and successful implementation of this mission. I would also like to thank all the technical staff of the centre who helped me with the harvesting and analysis of the fruits, and who welcomed me in their very pleasant Guest house.

I would also like to thank COGENT, and in particular its coordinator Pons Batugal, for giving me the opportunity and the means to carry out this very useful work of training and varietal cataloguing.

## **Executive summary**

The main objectives of the mission were to train Fijian researchers and collect information – pictures and texts - for the future edition of two COGENT catalogues of coconut germplasm. It was a good opportunity to visit the Taveuni coconut Centre (TCC) in January 2001, because M. Vijendra Kumar, is now studying in Samoa for one year. Nobody else in Fiji will be able to conduct cataloguing activities until June 2001 (date of return of M. Tevita Kete from its Philippines study journey). A big work of standardization was done to fit the Fijian coconut cultivar names with international standards. The data in the Coconut Genetic resources database was improved, especially for passports and fruit analysis. Most of the available data were inputted in the CGRD database. Most of the pictures requested for the catalogues were done during the mission, and the negative films were kept in TCC. It was agreed that Fijian researchers will soon make the few remaining pictures and will complete and revise the textual description for the publication of both COGENT and local catalogues.

## Activities conducted in Fiji

The main objective of the mission was to collect information –pictures and text- for the future edition of the two Cogent catalogues of coconut germplasm.

It was a good opportunity for me to visit TCC in January 2001, because M. Vijendra Kumar, head of TCC, is now studying in Samoa for one year. Nobody else in Fiji will be able to conduct cataloguing activities until June 2001 (date of return of M. Tevita Kete from its Philippines Study journey). Anyway, text writing and revision can be made by V. Kumar from Samoa.

Most of the pictures had to be done during R. Bourdeix mission. The personal camera of Mr Vijendra Kumar, head of TCC, is now out of order. There is no camera available at TCC. We suggest that the current COGENT project in Fiji should include in its budget the buying of a camera for TCC.

A big work of standardisation had to be done to fit the Fijian coconut cultivar names with international standards (see Table 1). The data in CGRD was improved, especially for passports and fruit analysis. Most of the available data were inputted in the CGRD database and will remain fully available for the future. Anyway, these data need again to be carefully checked (especially characterisation for yield and flower biology), but it was not the objective of the mission and anyway time was too short to do it. That will have to be done later by Fijian researchers, with eventually the help of a statistician.

Literature review had to be done to better understand and re-trace the history of numerous coconut surveys and selections conducted in Fiji, especially for the tall populations of Rotuma, Fiji and Rennell and the Niu Leka Dwarf from 1928 to nowadays. Result of this review will be included as historical section of each cultivar description.

Table 2 gives the list of cultivars to be described by Fiji for the catalogue of conserved germplasm. From the thirteen accessions available in TCC fields in January 2001, all of them will be illustrated in the world catalogue of conserved germplasm. Some of them will be described using plates provided by R. Bourdeix or other countries.

Table 3 gives the list of germplasm identified during the surveys that will be described in the catalogue of farmers varieties. Four populations with separate plates of picture and text. All the other coconut types, forms or variants of these coconut populations (such as spicata, red, yellow, striped colour forms) will be cited in the texts and, if possible, illustrated by at least one additional picture (the round one) in one of the plates.

Table 4 gives a list of pictures made in Fiji during R. Bourdeix Mission. About 150 pictures of coconut germplasm were taken; the techniques for making good coconut pictures were taught to TCC. This table also gives the pictures remaining to be done

Annex 1 gives the texts available at the end of the mission; **these texts will have to be improved and completed by Fijian researchers, especially for general presentation and botanical descriptions of the whole palm. The final version will have to be sent in Malaysia, Cogent Office, before the 20 of February 2001.**

**Table 1: Updating of cultivars names in Fiji**

Old International Cultivar name	New international Cultivar Name	Accession number	Remarks from V. Kumar and R. Bourdeix	Updating of the data
Fijian Tall (FJT)	No Change	TCC FJT		
Fijian Tall (FJT)	Fijian Tall Lakeba (FJT04)	TCC FJT LAK	Take in account numbers already given to Fiji tall population by CPCRI India Germplasm Bank	
Fijian Tall (FJT)	Fijian Tall Taveuni (FJT01)	TCC FJT TAV		
Fijian Tall (FJT)	Fijian Tall Tuvumaca (FJT05)	TCC FJT TUV		
Fijian Tall (FJT)	Fijian Tall Ura (FJT06)	TCC FJT URA		
Rotuma Tall RTMT	No Change	TCC ROT		
Niu Leka Dwarf	No Change	TCC NLD		
Malayan Green Dwarf	Pilipog Green Dwarf Taveuni (PILD02)	TCC MGD	Identified by R. Bourdeix	
Rennell Island Tall (RIT)	No Change	TCC RLT		
Malayan Yellow Dwarf (MYD)	No Change	TCC MYD		
Malayan Red Dwarf	No Change	TCC MRD		
	Rotuma Tall Sweet husk (RTMT02)	TCC RTMT02	New population	
	Magimagi Tall (MGT)	TCC MGT	New cultivar	
	Kitu Tall (KUT)	TCC KUT	New cultivar	
Fiji Niu Bulundrau Tall (FJBT)	No change	TCC FJBT	New acquisition	Name given by CPCRI in India

**Table 2: Cultivars conserved in TCC  
to be described in the catalogue of conserved germplasm**

Cultivar Name	Proposed authors of the form	Proposed action in Taveuni	Remarks from J.P. V. Kumar
1. Fijian Tall (FJT)	Kumar V., Kete T., Bourdeix R.,	Text writing and pictures	
2. Fijian Tall Lakeba (FJT04)	Kumar V., Kete T.	Text writing and pictures	
3. Fijian Tall Taveuni (FJT01)	Kumar V., Kete T.	Text writing and pictures	
4. Fijian Tall Tuvumaca (FJT05)	Kumar V., Kete T.	Text writing and pictures	
5. Fijian Tall Ura (FJT06)	Kumar V., Kete T.	Text writing and pictures	
6. Rotuma Tall RTMT	Kumar V., Rotuma researcher, Bourdeix R.,	Text writing and pictures	
7. Niu Leka Dwarf	Kumar V., Bourdeix R.	Text writing and pictures of fruit and palm picture only	Use other pictures and text from R. Bourdeix
8. Rennell Island Tall (RIT)	Bourdeix R., Konan J.L., Labouisse J.P.	Photos of fruits only	(International control) Use picture and text from R. Bourdeix
9. Malayan Yellow Dwarf (MYD)	Bourdeix R., Batugal, Malayan Researcher	Photos of fruits only	(International control) Use picture and text from R. Bourdeix
10. Malayan Red Dwarf	Bourdeix R., Batugal, Malayan Researcher	-	Use picture and text from R. Bourdeix

**Table 3: Cultivars and forms identified in Fiji Islands to be described in the catalogue of farmer's varieties**

Proposed Name	Cultivar	Proposed authors of the Sheet	Proposed action in Fiji	Remarks
Magimagi (MGT)	Tall	Kumar V., Kete T.	Text writing and photos	OK collected. New name given by V. Kumar. Proposed as Niu Kafa Tall Magimagi by R. Bourdeix (NKFT02)
Fiji Niu Bulundrau Tall (FJBT)		Kumar V., Kete T.	Text writing and photos	OK collected. Already named by CPCRI, India
Kitu Tall (KUT)		Kumar V., Kete T.	Text writing and photos	OK New name given by V. Kumar. Not yet collected but that will be done soon
Rotuma tall Sweet husk (RTMT02)		Kumar V., Kete T.	Text writing and photos	OK. collected. Other variant identified in Rotuma will be also mentioned in this plate.

Malayan Red Dwarf			None	Use R. Bourdeix picture
Malayan Yellow Dwarf (MYD)		12 fruits, 3 Husked nuts	None	Use R. Bourdeix picture
Niu Leka Dwarf		12 fruits, 3 Husked nuts	None	Use R. Bourdeix picture
Rennell Island Tall (RIT)		12 fruits, 3 Husked nuts, Bunch	None	Use R. Bourdeix picture
Rotuma Tall RTMT		12 fruits, 3 Husked nuts, Palm, Bunch, Whole Palm	None	Some R. Bourdeix picture may be used
Rotuma Tall Sweet husk (RTMT02)				Try to identify palms in TCC (more than 1500 RTMT)

**Table 4: Cultivars and forms from Fiji to be described in the catalogues**

Proposed Cultivar Name	12 fruits	3 husked Fruits	Whole palm	Bunch	Inflorescence	Round picture	Other picture	Remarks
Fiji Niu Bulundrau Tall (FJBT)	RB07 A07	RB07 A06	RB07 A24	RB07 A36	Nil	RB07 A22	RB07 A32	
Fijian Tall (FJT)						RB09 A06		Not sure (Indians ?)
Fijian Tall Lakeba (FJT04)	RB06 A18	RB06 A15	RB09 A23	RB08 A36	RB08 A33	RB06 A29		
Fijian Tall Taveuni (FJT01)	RB06 A21	RB06 A20	Nil	RB08 A28	RB08 A27	Coconut cheese		
Fijian Tall Tuvumaca (FJT05)	RB06 A10	RB06 A08	VK01 A03	VK01 A02	VK01 A01	RB09 A20		
Fijian Tall Ura (FJT06)	RB06 A06	RB06 A04	VK01 A12	VK01 A10	VK01 A04	RB09 A09		
Kitu Tall (KUT)	RB07 A12	RB07 A03	RB08 A04	RB07 A19	RB07 A16	RB07 A27		
Magimagi Tall (MGT)	RB07 A09	RB07 A02	RB08 A08	RB08 A14	RB07 A30	RB07 A22		
Niu Leka Dwarf	RB06 A14	RB06 A12						Use pictures from R. Bourdeix
Rennell Island Tall (RIT)	RB06 A28			RB08 A22				Use pictures from R. Bourdeix
Rotuma Tall RTMT	RB06 A03	RB06 A01	VK01 A06	RB08 A20		RB09 A26		Use pictures from R. Bourdeix
Rotuma Tall Sweet husk (RTMT02)		VK02 A26	VK02 A17					
Malayan Yellow Dwarf (MRD)	RB06 A31	RB06 A26						International control

**Annex 1:**

**Texts available at the end of Dr R. Bourdeix visit**  
*(To be completed by Fijian Researchers and sent in Malaysia  
before the 20 of February 2001).*

Note from R. Bourdeix: all the literature cited is available in a separate text file updated daily with the evolution of the writing. A copy has been let to TCC in Fiji.



## **Fiji Niu Bulundrau Tall (FJBT) <sup>1</sup>**

### Historical

In 1963, McPaul had already identified 6 local Fijian varieties, stated as 'non-commercial'. One of these varieties was called the Niu Drau or Bula Drau, described as a tall palm bearing a large number of very small nuts on each bunch. In Fijian language, Niu is Coconut and Drau means “one hundred”. This type of coconut palm was also mentioned by Parham (1966) who conducted an early survey in the Pacific Region for the search of large fruited coconut cultivars with funding from the South Pacific Commission. In 1981, the population Fiji Tall Wainigata (FJT02) was sent from the Wainigata Research Station, in the Savu Savu island of Fiji, to the World Coconut Genetic Centre, in the Andaman Islands of India. Twenty-two of the 100 seednuts introduced in India turns to the phenotype “Niu Drau”. It was then decided by Indian researchers to call these one as a new cultivar, Fiji Niu Bulundrau Tall (FJBT). In 1997, V. Kumar II and T. Kete from Fiji conducted another survey in the framework of the ADB and IFAD funded projects for collecting and identifying coconut germplasm. They selected some new parent palms and harvested seednuts for planting at the Taveuni Coconut Centre in Fiji.

### Conservation status

This type of coconut palm is not rare in Fiji. It occurs quite frequently inside the villages, but it can be also found occasionally in coconut groves. According to the CGRD.4, only two accessions of this cultivars are conserved in germplasm collections of India and Fiji, for a total of 44 (?? To be checked) living palm. Palms can be also seen in farmers' fields and gardens, such as the village of XXX in Taveuni island, garden of M. ZZZZ, where the whole palm coconut photography presented was taken.

### Botanical description

Fruits are of brown or green colour when young. There are mostly little, pointed at the distal part, and etc... The cultivar recorded as 'Laccadive Micro Tall (LMT)' in India have rather similar characteristics.

### Yield and Agronomic value

No fruit composition data is available from CGRD versus 1999. According to Parham (1966), the Fiji palm called the Niu Drau (one hundred coconuts) bears a large number of coconuts, but it was found to be a variable character. The palm may deserve the name for one or two years and then revert to the more normal type. This was not recorded during the PRAS survey conducted by V. Kuar and al. and will have to be checked again. Even if this phenomenon is confirmed, not all the palm from the Fiji tall populations may have the requested genotype to become periodically a ‘Niu Drau’ Type’.

### Adaptation

If the “Niu Drau” phenotype is only a periodical habit, has stated by Parham (1966), the strategy of producing an exceptionally large number of little fruits may be seen as an adaptive strategy of the palm. Production of a large number of little fruits may increase the probability for the progeny to survive in some special situations. This can occur where there is no (or a lot of) fruit predators and when rapid dissemination of numerous light seednuts is favoured. But the same palm may conserve the ability of producing bigger and better husk-protected seednuts during the other periods of his life....

### Pest and diseases

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<sup>1</sup> (Proposed) authors: V. Kumar, R. Bourdeix and an Indian researcher.

### Utilisations

The little nut is almost valueless for all the classical utilisation of the coconut meat, such as making copra or preparing food. But the little coconut to drink is said by farmers to be much sweeter and tastier than those or the normal Fiji tall. The albumen of these young nuts, when 5 to 7 mm thick is particularly sweet and soft, apparently with a lower level of fibre. In the Pacific region, from Vanuatu to Tonga islands, such cultivars are frequently used during fiesta and especially weddings. When many guests come to house, it is convenient to provide them these little and tasty young coconuts to drink. Little shells are also used to produce special artefacts.

### Genetics and breeding

As far as we know, this form or cultivar has never been used as parental material in a breeding programme.

## **Fijian Tall (FJT)**

### Proposed authors

Kumar V., Kete T., Bourdeix R.,

### Conservation status

### Historical

FJT: In Fiji, the first large scale industrial coconut plantings were made mainly between 1880 and 1910. In 1963, McPaul had already identified 6 local Fijian varieties, stated as 'non-commercial': Niu Drau or Bula Drau (Tall palm bearing a large number of very small nuts on each bunch), Niu Ni Toga or Niu Kitu (Tall palm producing large nuts similar to the Rotuma type), Niu Ni Magimagi (Tall palm with large, elongated nuts with thick husk); Niu Yabia or weeping Coconut (Uncommon Tall pal with distinctly drooping leaves and producing very few fruits), Niu Yalewa (spicata type), and Uta (fruit's husk is sweet and edible when young).

### Botanical description

### Yield and Agronomic value

### Adaptation

### Pest and diseases

### Utilisations

### Genetics and breeding

## **Fijian Tall Lakeba (FJT04)**

### Proposed authors

Kumar V., Kete T.

### Conservation status

### Historical

A project was started in 1983 to choose high yielding palms among outstanding existing coconut groves (Ministry of Primary Industries of Fiji, 1985). This study was based on Tuvumaca and Nakeba Estates on Taveuni Island.

### Botanical description

Compared to other Fijian tall Population (such as Taveuni, Tuvumaca, Ura), the husk content of Fijian Tall Lakeba seems to be a little reduced. The fruits are pointed at the stigmatic point. Their equatorial cuts reveal a very spherical section.

### Yield and Agronomic value

### Adaptation

According to V. Kumar (Anonymous, 1983), "the Fiji Tall of 1920-1922 planting before the cattle yard at Nakeba were neither having good characteristics for mother palm nor were very impressing for selection. However, some one hundred palms carrying 40-60 nuts per palms and over 40 feet in height were selected and marked. Also, the palms seemed to have suffered about 10-15 % damage by the cyclone Sera..."

### Pest and diseases

### Utilisations

### Genetics and breeding

The project started in 1983 at Taveuni, Fiji involved taking records every six months on palms from Three local varieties. 250 Fiji tall (FJT), 50 Rotuma tall (RTMT) and one hundred Niu Leka Dwarf (NLAD), were first selected on desirable phenotypic characteristics and then observed (Ministry of Primary Industries of Fiji, 1985). The records kept includes number of nuts per bunch and per palm, weight of copra per nut. 40 FJT, 36 RTMT and 40 NLAD were selected in 1986 and used to produce experimental hybrids. The main selection criterion was the weight of copra per nut (Ministry of Primary Industries of Fiji, 1987) which is a heritable characteristic but may have a negative correlation with the total yield of copra produced per palm per year (Bourdeix, 1988).

## **Fijian Tall Taveuni (FJT01)**

Proposed authors

Kumar V., Kete T., Bourdeix R.

Conservation status

Historical

Botanical description

Yield and Agronomic value

Adaptation

Pest and diseases

Utilisations

Genetics and breeding

## **Fijian Tall Tuvumaca (FJT05)**

Proposed authors

Kumar V., Kete T.

Conservation status

Historical

In the 1980's, investigations have shown that significant differences occur between populations of Fiji tall coconut palm in Fiji. In 1983, a Fijian project was started to choose high yielding palms among outstanding existing coconut groves (Ministry of Primary Industries of Fiji, 1985). This study was based on Tuvumaca and Nakeba Estates on Taveuni Island. According to V. Kumar (Anonymous, 1983), "...some 200 younger Fiji Tall of approximatively 30 years were marked just adjacent to the Rotuman Tall at Tuvamaca. In 1986, Manciot et al., after studying the fruit characteristics of the selected palms, collected about three thousand seednuts from Tuvamaca estate and 2500 seednuts from Ura Estate. Manciot et al. said that "it is evident that Fijian tall from Ura estate are different from those of Tuvamaca estate (Ministry of Primary Industries of Fiji, 1988).

Botanical description

The fruits are oblong in longitudinal shape, but their equatorial section is round to very slightly angular. Anyway, the nuts inside the husk always have a round equatorial section. No or very little difference can be seen between fruits of Fijian tall Tuvumaca and Taveuni. The difference between these two populations is not obvious but may result from the selection rates and criterion applied to the choice of parental material.

Yield and Agronomic value

Adaptation

Pest and diseases

Utilisations

Genetics and breeding

The project started in 1983 at Taveuni, Fiji involved taking records every six months on palms from Three local varieties. 250 Fiji tall (FJT), 50 Rotuma tall (RTMT) and 100 Niu Leka Dwarf (NLAD), were first selected on desirable phenotypic characteristics and then observed (Ministry of Primary Industries of Fiji, 1985). The records kept includes number of nuts per bunch and per palm, weight of copra per nut. in 1986, 40 FJT, 36 RTMT and 40 NLAD were selected and used to produce experimental hybrids. The main selection criterion was the weight of copra per nut (Ministry of Primary Industries of Fiji, 1987) which is a heritable characteristic but may have a negative correlation with the total yield of copra produced per palm per year (Bourdeix, 1988).

## **Fijian Tall Ura (FJT06)**

Proposed authors

Kumar V., Kete T.

Conservation status

Historical

FJT: In the 1980's, investigations have shown that significant differences occur between populations of Fiji tall coconut palm in Fiji. A survey was undertaken in 1986 by Manciot et al. who studied the fruits characteristics and collected 2500 seednuts from Ura estate (South Taveuni) and about 3000 seednuts from Tuvamaca estate. Manciot et al. said that "it is evident that FJT from Ura estate are different from those of Tuvamaca estate (Ministry of Primary Industries of Fiji, 1988)

Botanical description

Compared to other Fijian tall Population (such as Lakeba, Taveuni, Tuvumaca), the husk content of Fijian Tall Ura seems to be more important. The fruits are oblong, but their equatorial cuts reveal a quite angular section. Anyway, the nuts inside the husk always have a round equatorial section.

Yield and Agronomic value

Adaptation

Pest and diseases

Utilisations

Genetics and breeding

## **Kitu Tall (KUT)**

Proposed authors

Kumar V., Kete T., Bourdeix R.,

Conservation status

Historical

Botanical description

Yield and Agronomic value

Adaptation

Pest and diseases

Utilisations

Genetics and breeding



## Magimagi Tall (MGT)

### Proposed authors

V. Kumar and T. Kete

### Conservation status

note: speak of the conservation initiative developed by TCC (LOA with farmers...)

### Historical

In 1963, McPaul had already identified 6 local Fijian varieties, stated as 'non-commercial'. One of these varieties was the Niu Ni Magimagi, described as a tall palm producing large, elongated fruits with thick husk.

### Botanical description

### Yield and Agronomic value

### Adaptation

According to Harries (1978), "the evolution, dissemination and classification of the coconut can be considered as a logical sequence. First came the natural evolution and dissemination by floating of a variety with large, long, angular, thick husked and slow germinating fruits (...) From this type, selection under cultivation produced a spherical fruited variety, not necessarily larger but with increased endosperm, reduced husk thickness, earlier germination and disease resistance."

### Pest and diseases

### Utilisations

According to Foale (1987) The Polynesians selected other palms that bore fruits which contained long fibres to make strong twine and ropes for use in construction of both buildings and boats. The Magimagi tall may be one of these old varieties, known in other Pacific islands under the name "Niu Kafa".

### Genetics and breeding

The utilisation of coconut husk is now making a comeback, and it seems very important for the future to conserve and study this type of thick husked Coconut cultivar.

## **Niu Leka Dwarf (NLAD)**

### **Proposed authors**

Kumar V., Bourdeix R.

### **Conservation status**

The only considerable area of Niu Leka Dwarf in Fiji occurs on Nakeba estate, Taveuni, although individual palms are occasionally found throughout all the island's coconut growing area. According to the CGRD database, the cultivar NLAD is represented by 18 accessions totalizing 1310 coconut palms conserved in at least 9 countries.

### **Historical**

A Coconut palm named "Niu Leka" was reported more than a hundred years ago (Powel, 1968, cited by Harries, 1978) and it is found under the same name in Tonga and Fiji. The first description of this dwarf cultivars from Fiji was as early as 1920 (Anonymous, 1920, cited by Gangolly et al., 1957), but it seems to be quite "fantasist": NLAD, described as N'uleka, was said to begin to bears in 5 years and to be a prolific yielder, producing more than 400 medium size nuts per tree per year. Another Fiji Dwarf was mentioned in the same publication, so called N'udam, and also said to be a very hardy type, quick and good bearer of round nuts with an exceptionally thin husk.

### **Botanical description**

NLAD was first named 'Niu Leka Green Dwarf', but the mention of the colour was later removed. The nuts are usually greenish but may be also brownish and are of various shapes. In 2001, two nice yellow NLAD palms can be seen from the main road along Nakeba estate. The appearance of this tree is very peculiar. Those who contemplate it for the first time sometimes have the reflex to say - "it's not a coconut tree!". And yet, yes, it is! The stipe is massive, with a basal bulb very marked for a dwarf. The leaves are short and rigid, with broad, dark green leaflets that cover each other and allow little light to pass through. On a tree from which no leaves have been cut, it is difficult to see the fruit. As the height growth is very low, the stipe also remains hidden by the leaves for a long time. The Niu Leka dwarf blooms on average 66 to 95 months after planting, while most other dwarfs flower before three years of age. The inflorescence is compact, with a thick peduncle, short spikelets almost perpendicular to the axis. Along with the greater Tahiti (TAT), the Niu Leka dwarf is the variety that, in Côte d'Ivoire, has the largest number of spikelets per inflorescence. Unlike most other dwarf cultivars, NLD is characterized by a cross-pollinate reproductive pattern. The fruits are bulky for those of a dwarf, oblong to rounded in shape, with a fairly high proportion of filling (43%). Inside the fruit, the almost spherical nut contains a thick endosperm that gives a copra that is quite low in oil (59%). The only criterion that allows this cultivar to be classified as a dwarf is its very low growth in height; otherwise, by its flared stipe at the base, by its late flowering, by its allogamous mode of reproduction, by its low fruit production, NLD is more akin to some tall cultivars. Various molecular biology studies have confirmed this aspect.

### **Yield and Agronomic value**

McPaul (1964) described the NLAD as an early bearing coconut palm, but we do not agree about this point. As a matter of fact, the vertical growth is very slow, so the first fruits are produced near the soil; but it takes a long time for the palm to begin flowering.

### **Adaptation**

### **Pest and diseases**

Niu Leka was also introduced from Côte d'Ivoire to Tanzania in 1991 to be tested against Lethal Yellowing Disease, where it gave quite promising results (Kulaya et al., 1997).

### **Utilisations**

### Genetics and breeding

The first hybrid coconut palm produced by controlled pollination were grown in Fiji by Marechal (1928) who crossed the Malayan Red Dwarf with NLAD. Progeny of this cross was then exported to various countries such as Solomon Islands in 1956 (Foale, 1987) and Jamaica. Although they show a great level of variability, they were never used as a commercial variety. In Côte d'Ivoire, the original accession, planted in 1967 at Assinie concession, was very heterogeneous. A severe selection has been made for the later reproduction of this accession. In 1983, a Fijian project was started to choose high yielding palms among outstanding existing coconut groves (Ministry of Primary Industries of Fiji, 1985). This study was based on Tuvumaca and Nakeba Estates on Taveuni Island. According to V. Kumar number 1, "Some Good Niu Leka mother palms of 1920-1922 planting were selected and marked in Nakeba estate in a block consisting of about 10-15 acres (Anonymous, 1983). The project started in 1983 at Taveuni, Fiji involved taking records every six months on palms from Three local varieties. 250 Fiji tall (FJT), 50 Rotuma tall (RTMT) and 100 Niu Leka Dwarf (NLAD), were first selected on desirable phenotypic characteristics and then observed (Ministry of Primary Industries of Fiji, 1985). 40 FJT, 36 RTMT and 40 NLAD were selected in 1986 and used to produce experimental hybrids. The main selection criterion was the weight of copra per nut (Ministry of Primary Industries of Fiji, 1987) which is a heritable characteristic but may have a negative correlation with the total yield of copra produced per palm per year (Bourdeix, 1988). out of 397 seedlings harvested from the 40 NLAD palms, only 102 (26%) true-to-type NLAD were identified. After this observation 17 palms out of the 40 original mother palms were eliminated ((Ministry of Primary Industries of Fiji, 1989). So, the NLAD now conserved at TCC were obtained from only 23 female parents selected among 100 palms.

The Niu Leka Dwarf has been of great interest to the coconut breeders. Its short leaves with wide leaflets made it possible to envisage high planting densities; The robustness of its stipe and its slow growth seemed interesting for areas periodically devastated by cyclones. In Côte d'Ivoire, NLD has been crossed with the MYD, MRD, EGD, CRD dwarfs and with the large RIT, TAT and WAT. In Jamaica, NLA has been crossed with MYD. In Vanuatu, it has been crossed with CRD, TON and VTT. It must be noted that these various attempts have not been crowned with success. In Côte d'Ivoire, all hybrids with NLA as a parent retain its unfavourable characteristics: late entry into production and poor production. However, on the Fiji archipelago, some natural hybrids between the dwarf Niu Leka and the greater Rotuma have shown better behaviour (Anon., 1986, cited by MANCIOT and SIVAN, 1991).

## **Rotuman Tall (RTMT)**

### **Proposed authors**

V. Kumar V. and R. Bourdeix

### **Conservation status**

According to the CGRD database, RTMT is conserved in at least 7 countries with a total of about 760 palms alive in 2001. But it exists in the Rotuma island special form or variant of the local tall that need to be more safely conserved.

According to the CGRD database, the cultivar RTMT is represented by 10 accessions totalizing 761 coconut palms conserved in at least 7 countries. List of acquisition dates and country of conservation: ,1960-IND,1960-SLB,1963-JAM,1969-CIV,1972-IND,1 983-BRA,1987-FJI,1988-TZA,1998-FJI

### **Historical**

According to Parham (1966), "the origin of the Rotuma palm is rather obscure but R.O.G. Masfield, in a 1955 unpublished report made for the department of agriculture of Fiji, considered that seednuts have been introduced from many pacific islands including Tonga and Samoa". R.W. Parham conducted a survey for the search of large fruited coconut cultivars with funding from the South Pacific Commission. This resulted in the introduction of a few seednuts from Rotuma Island, the Markham Valley, and KarKar Island (Papua New Guinea) to various Coconut Research Centre such as those of India, Solomon Islands, Fiji and Tahiti. Witthead (1966) suggested that Polynesian travellers would select Rotuma-type coconuts and carry these coconuts for the journey and establish them, accidentally or deliberately on arrival. Carried for food and drink it was taken, not just to the isolated islands, but to any islands en route (Harries, 1978). In Côte d'Ivoire, the introduction of seednuts was made from Rotuma Islands via the Vanuatu Research Centre (CGRD, 1999). Seednuts arrived in Santo, Vanuatu in February 1969 and were delivered at the Marc Delorme Research Station the 30 may (25% already germinated). The precise origin of all these seednuts collected between 1920 and 1970 remains uncertain. RTMT was later introduced from Côte d'Ivoire to Brazil (1983) and Tanzania (1988), this last to test its tolerance again the lethal yellowing disease. In 1998, V. Kumar conducted another survey at Rotuma island in the framework of the ADB/COGENT and IFAD projects. Two populations of Rotuman tall were surveyed. Special variants were identified using the Participatory Rural Appraisal Approach. Two of these forms (Sweet husk and Yellow-green stripped fruits) were collected and transferred to the Taveuni Coconut Centre.

### **Botanical description**

### **Yield and Agronomic value**

### **Adaptation**

### **Pest and diseases**

### **Utilisations**

According to R.W. Parham (1966), several large coconuts shells were seen during its survey in Rotuma Island. The rotumans stated that they came from very large fruits which had been encouraged

to grow to that size by pruning the bunches, leaving only two or three nuts on the palm to grow such a size.

#### Genetics and breeding

The Rotuma Tall (RTMT) was already available at Taveuni Coconut centre, Fiji, in the 1920's. Marechal (1928) crossed selections of heavy fruited Rotuma Tall. The RTMT progenies created were planted at Navuso near Nausori (Viti Levu Island) and began to flower in 1936. Open pollinated seednuts from these progenies were later widely distributed throughout Fiji (McPaul, 1964). In 1987, 5028 seednuts were moved from Rotuma Island to the seed garden in Taveuni Coconut Centre, Fiji (Ministry of Primary Industries of Fiji, 1988). RTMT pollen is now used in Taveuni Coconut Centre to produce hybrids seeds of Malayan Red Dwarf x RTMT at commercial scale. Introduction of pollen have also been made in 1969 from Yandina Research Station, Solomon islands to Côte d'Ivoire. This pollen has been used in the genetic trials 7 and 9 of Marc Delorme Research Station to cross with various other tall cultivars; no commercial varieties were identified in these African trials.

## **Rotuman Tall Sweet Husk (RTMT02)**

### **Proposed authors**

V. Kumar and A. Atalifo

### **Conservation status**

Endangered. Only 7 palms; not necessarily true to type, are planted at the Taveuni Coconut Centre. Most of the fruits are consumed before reaching maturity, so it is difficult to harvest seednuts.

### **Historical**

In 1963, McPaul had already identified 6 local Fijian varieties, stated as 'non-commercial'. One of these varieties was named Uta, described as a tall palm from Rotuma producing fruits with sweet and edible husk when young. Uta is also mentioned by R.W. Parham (1966) who conducted a survey for the search of large fruited coconut cultivars with funding from the South Pacific Commission. According to Parham (1966), "the origin of the Rotuma palm is rather obscure but R.O.G. Masfield, in a 1955 unpublished report made for the department of agriculture of Fiji, considered that seednuts have been introduced from many pacific islands including Tonga and Samoa". In 1998, V. Kumar conducted another survey at Rotuma island in the framework of the ADB/COGENT and IFAD projects. Two populations of Rotuma Tall were surveyed. Special variants were identified using the Participatory Rural Appraisal Approach. Two of these variants (the Sweet Husk and Yellow-green stripped fruits) were collected and transferred to the Taveuni Coconut Centre.

### **Botanical description**

### **Yield and Agronomic value**

### **Adaptation**

### **Pest and diseases**

The sweet young fruits are also very appreciated by rats and flying dogs.

### **Utilisations**

According to R.W. Parham (1966), several large coconuts shells were seen during its survey in Rotuma Island. The rotumans stated that they came from very large fruits which had been encouraged to grow to that size by pruning the bunches, leaving only two or three nuts on the palm to grow such a size.

### **Genetics and breeding**