# Improved Varieties of Coconut, Arecanut and Cocoa

**ICAR-CPCRI Contribution** 

V. Niral
K.S. Ananda
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P. Chowdappa







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# INTRODUCTION

Plantation crops occupy a niche position in the Indian economy in terms of production, consumption and exports. Among the plantation crops, coconut, arecanut and cocoa are predominantly grown by small holders in India and are significantly supporting and sustaining the livelihoods of millions of growers in the country. Together, these crops contribute to the national agrarian economy, with annual contribution to the GDP to the tune of about Rs. 9000 crores and foreign exchange earnings of about Rs. 1200 crores, besides supporting subsidiary industrial development.

Central Plantation Crops Research Institute (ICAR-CPCRI), under the Indian Council of Agricultural Research, is the national institute mandated to undertake and coordinate research on coconut, arecanut and cocoa in the country. The present institute has grown from 1916 till date, assembled large collection of diverse genetic resources of these crops and facilitated research and development. The systematic research efforts over the years have yielded fruitful results in terms of increasing the production, productivity and profitability of the mandate crops. In the past few decades, coconut production in the country has increased from 12678 million nuts (6952 nuts/ha) during the year 2001 to 21665 million nuts (10122 nuts/ha) in 2014 with about 3.5 percent compound growth rate of production. India is one among the three major coconut production of arecanut, with an annual production of 559 thousand tons from an area of 396.8 thousand hectares. Over the decades, the nation has witnessed increase in arecanut productivity from 857 kg/ha in 1970 to around 1200 kg/ha at present. India at present produces about 12954 tons of cocoa from an area of 46318 hectares which is only about 40 percent of the annual domestic demand of nearly 30,000 tons.

The institute has devoted considerable focus on the development of improved varieties for specific uses and for cultivation in different states and various agro-ecological zones of the country. Concerted research efforts have resulted in improved coconut varieties capable of producing 2.79 to 5.01 tons of copra/ha/year for commercial cultivation in different parts of the country. Twenty five improved high yielding coconut varieties including 19 selections and six hybrids have been released, suitable for copra, tender nut, biotic and abiotic stress tolerance as well as ornamental purpose. These improved coconut varieties are capable of producing two to six times higher yield than the locally grown varieties in different agro-ecological regions of the country. Eleven improved varieties of arecanut have been released including nine selections and two dwarf hybrids. These varieties have shown higher dry kernel recovery and in addition have contributed to about two

to three fold increase in the nut yield over local varieties. In cocoa, eight high yielding varieties, including three elite clones and five hybrids, have been released by the institute, with potential to give higher yield of up to 3 kg dry bean/tree/year with superior bean processing qualities.

It is recommended to plant coconut and arecanut seedlings in pits of 90-100 cm³. The pits are to be filled with top soil, sand and compost up to 50 cm and seedlings should be planted at the centre of the pit and covered with soil up to the collar region. Cocoa seedlings are to be planted in pits of 60 cm³ filled with compost. A spacing of 7.5 m x 7.5 m is recommended for coconut, corresponding to a population of about 177 palms per hectare. Wider palm to palm spacing of 9-10 m can also be adopted, to enable establishment of appropriate coconut based cropping systems. The recommended spacing for arecanut is 2.7 m x 2.7 m, corresponding to a population of about 1370 palms per hectare. Slightly wider spacing of 3.3 m x 3.3 m can be adopted, to facilitate establishment of appropriate arecanut based cropping systems. Cocoa is normally planted in 2.7 m x 5.4 m spacing in areca garden, accommodating about 685 cocoo trees per hectare. When cocoa is to be raised as a mixed crop with coconut, single hedge or double hedge system of planting can be adopted. In single hedge system, cocoa can be planted 2.7 m apart in a single row between two rows of coconut, accommodating about 500 cocoa trees per hectare. Higher population of cocoa trees can be accommodated in double hedge system, by planting cocoa seedlings 2.5 m apart in paired rows between two rows of coconut palms.

ICAR-CPCRI supplies breeder seed material of these improved varieties for establishment of mother gardens in different parts of the country to cater the planting material needs of the farming community. The Institute also provides planting material of these improved varieties to farmers for establishment of plantations and endeavours to facilitate higher crop productivity and higher returns in the country. The farmers, producer societies/federations, entrepreneurs and NGOs are encouraged to establish seed gardens of improved varieties for meeting the demand for quality planting material and to facilitate area expansion under released/notified varieties in different regions of the country. This publication documents the varietal wealth created and dedicated to the nation in these crops by ICAR-CPCRI.

# COCONUT

# Taxonomic information

Kingdom: Plantae

Sub kingdom: Tracheobionta

Super division: Spermatophyta

Division: Magnoliophyta

Class: Liliopsida

Sub class: Arecidae

Order: Arecales

Family: Arecaceae

Genus: Cocos L.

Species: Cocos nucifera L.

Common name: Coconut Palm



# **CHOWGHAT ORANGE DWARF**

National Identity	IC 430664
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	-
Breeding method & Parentage	Selection from indigenous Chowghat Orange Dwarf, IND 007, found particularly in the Chovakkad area of Thrissur district of Kerala
Recommended	
Purpose	Dwarf voriety producing aftroctive orange coloured fruits suitable for consumption as tender nuts
State/ecological region	All coconut growing regions
Yield performance in evaluatio	n trial (irrigated condition)
Mean	112 nuts/palm/year; 19824 nuts/ha/year 14.34 kg copra/palm/year; 2.78 t copra/ha/year 9.46 kg oil/palm/year; 1.83 t oil/ha/year
Potential	192 nuts/palm/year; 33984 nuts/ha/year 24.19 kg copra/palm/year; 4.3 t copra/ha/year 15.75 kg ail/palm/year; 2.8 tons oil/ha/year
Description of variety	
Morphological characters	Hobit: Dwarf, with campoct crawn and stem without prominent bole Fruits: Red yellow (orange), medium-size and round in shope; Fruit weight - 750 g; Capra content - 128 g; Oil - 66% Husked fruits: Raund in shape and medium in size Seedlings: Red yellow petiole; 12 month seedlings have 7-8 leaves, collor girth of 12.5 cm and height 137 cm
Flowering attributes	Flawer initiation – 26-30 months after planting
Quality attributes	Tender nut water content – 351 ml Tender nut water taste - Very goad Tender nut water : TSS – 6.4° Brix; Na - 20 ppm; K – 2000 ppm; Total sugars - 7 g/100 ml
Reaction ta major diseases/pests	No major disease attacks observed under field conditions. However, it is moderately susceptible to bud rot. They are also ottacked by rhinoceros beetle. The voriety is less affected by eriaphyid mite.
Reaction to environmental stresses	Recommended for large scale cultivation only under irrigated conditions
Specific recommendations, for seed production	Cantrolled pollination af selected polms and seedling selection is recammended for production of breeder seed.  For large scole seed production, seed gardens are to be established.  Over 90 per cent of open pollinated progenies show similarity to parental palms and hence large scale planting material production winot be a constraint in area expansion.

#### Other pertinent information/references

Recommended for release: X AICRPP Group Meeting - 1991

CPCRI 1992. Annual Report 1991-92. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 188 p.

Niral, V., B Augustine Jerard, Samsudeen, K., Regi J Thomas and George V. Thomos. 2014. Coconut Varieties and Hybrids. CPCRi Technical Bulletin Na. 87. Central Plantation Craps Research Institute, Kasaragod, Kerala, India, 40 p.



## KALPA JYOTHI

National Identity	IC 599666
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	All India Co-ordinated Research Project on Palms, Coconut Research Station: Kahikuchi, Assam and Arsikere, Karnataka
Breeding method & Parentage	Selection from CPCRI accession IND 058, Malayan Yellow Dwarf (EC 548008) introduced from Malaysia in 1961
Recommended	
Purpose	Tender nuts
State/ecological region	Coconut growing tracts af Kerala, Assam and Karnataka
Yield performance in evalua	ation trial (irrigated condition)
Mean	114 nuts/palm/year; 20178 nuts/ha/year 16.19 kg capra/palm/year; 2.83 t copra/ha/year 9.96 kg oil/palm/year; 1.74 t oil/ha/year
Potential	169 nuts/palm/year; 29947 nuts/ha/year 24.00 kg copra/palm/year; 4.25 t copra/ha/year 14.76 kg oil/palm/year; 2.62 t oil/ha/year
Description of variety	
Morphological features	Habit: Dwarf with compact canopy, drooping leaf tip and stem without prominent bole Fruits: Yellow, medium-size and oval shape; Fruit weight - 649 g; Coprocontent - 142 g; Oil - 61.5% Dehusked fruits: Round in shape Seedlings: Yellow petiole; 12 month seedling have 8-9 leaves, collar girth of 11-12 cm and height 138-146 cm
Flowering attributes	Flower initiation: 30-38 months after planting; very early flowering 24 months after planting recorded under intensive management and favourable conditions
Quality attributes	Tender nut water content: 380 ml Tender nut water taste: Very good Tender nut water: TSS - 5.9° Brix; Na - 36 ppm; K - 1988 ppm; Total sugars - 6.2 g/100 ml; Amino acids –1.7 mg/100 ml
Reaction to major diseases/ pests	No major disease attacks observed under field conditions. Hawever, this variety is moderately susceptible to bud rot. They are attacked by rhinoceros beetle and occasionally by red palm weevil. The variety is moderately affected by eriophyid mite.
Reaction to environmental stresses	Recommended for large scale cultivation under irrigated canditions However, among dwarfs evaluated, this variety exhibits better tolerance to water deficit stress.
Specific recommendations, for seed production	Controlled pollination of selected palms and seedling selection is recommended for production of breeder seed.  For large scale seed production, seed gardens are to be established. Ove 95 per cent of open pollinated progenies show similarity ta parental palms and hence large scale planting material production will not be a constrain in area expansion

#### Other pertinent information/references

Recommended for release: XXI AICRPP Meeting - 2012 Notification: Awaited. Approved in 23rd CVRC for Horticultural Crops - 2014 Registration: Under consideration with PPV&FR Authority

CPCRI. 2013. Annual Report 2012-13. Central Plantation Crops Research Institute, Kasaragod, Kerala, India,

116 p.
Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.



# KALPA SURYA

IC 599667
ICAR-Central Plantotion Crops Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Ali India Co-ordinated Reseorch Project on Palms, Coconut Research Station: Aliyarnagar, Tamil Nadu and Arsikere, Karnataka
Selection from CPCRI accession IND 048, Malayon Orange Dwarf (EC 548007) population, introduced from Malaysia in 1960
Tender nuts
Coconut growing tracts of Kerala, Tamii Nadu and Karnataka
tion trial (irrigated conditions)
123 nuts/palm/year; 21771 nuts/ha/year 22.88 kg copra/palm/year; 4.00 t copra/ha/year 15.33 kg oil/palm/year; 2.68 t oil/palm/year
182 nuts/palm/year; 32083 nuts/ha/year 33.85 kg copra/palm/year; 5.97 t copra/ha/year 22.68 kg oil/palm/year; 4.0 t oil/ha/year
Habit: Dwarf with compoct canopy, droaping leaf tip and stem without prominent bole Fruits: Orange (red-yellow), medium-size and oval shape; Fruit weight - 909 g; Copra content - 186 g; Oil - 67% Dehusked fruits: Round in shape Seedlings: Orange (red-yellow) petiole; 12 month seedlings have 7-8 leaves, collar girth of 11 cm and height 157 cm
Flower initiation: 39 months after planting
Tender nut water content: 400 ml Tender nut water taste: Very good Tender nut water: TSS – 6.2º Brix; Na - 35 ppm; K - 2142 ppm
No major disease attacks observed under field conditions. This variety is moderately susceptible to bud rot. They are attacked by rhinaceros beetle and occasionally by red palm weevil. The variety is moderately affected by eriophyid mite.
Recommended for large scale cultivation only under irrigated conditions.
Controlled pollination of selected palms and seedling selection is recommended for production of breeder seed. For large scale seed production, seed gardens are to be established. Over 93 per cent of open pollinoted progenies show similarity to parental palms and hence large scale planting material production will not be a constraint in area expansion

#### Other pertinent information/references

Recommended for release: XXI AICRPP Meeting - 2012

Notification: Awaited. Approved in 23rd CVRC for Horticultural Crops - 2014

Registration: Under consideration with PPV & FR Authority

CPCRI. 2013. Annual Report 2012-13. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 140 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas, 2014. Coconut Varieties and Hybrids, CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.



## **KALPASREE**

National Identity	IC 591018
Institution responsible for developing variety	ICAR-Central Plontation Crops Research Institute, Regional Station, Koyamkulam, Alappuzha District, Kerala
Collaborating centre(s), if any	
Breeding method & Parentage	Selection from Chowghat Green Dwarf (IND 029) population, grown in formers plots
Recommended	
Purpose	High yield in root (wilt) troits, superior oil rich in linoleic acid
State/ecological region	Homesteods of the root (wilt) disease prevalent tract
Yield performance in evalua	ation trial (root wilt disease tracts)
Mean	90 nuts/palm/yeor; 15930 nuts/ha/yeor (21240 nuts/ha/year @236 palms/ha) 8.64 kg copra/palm/yeor; 1.51 t copra/ha/year (2.045 t copra/ha/yeor @236 palms/ha) 5.75 kg oil/palm/yeor; 1.00 t oil/ha/year
Potential	107 nuts/palm/year; 18725 nuts/ha/year 10.27 kg copra/palm/yeor; 1.80 t copra/ha/year 6.83 kg oil/palm/year; 1.20 t oil/ha/year
Description of variety	
Morphological features	Habit: Dwarf with compact, circular canopy, slender stem without bole Fruits: Dork green, medium-size, oblong shape with a choracteristic "beok" in mature fruit; Fruit weight - 683 g; Copra content - 96 g; Oil - 66.5% Dehusked fruits: Oval in shape Seedlings: Green petiole; 12 month seedlings have 7-8 leaves with high collar girth and height around 130-160 cm
Flowering attributes	Flower initiation: 36-40 months after planting; very early flowering 18 months after planting is also observed
Quality attributes	Tender nut water content: 240 ml Tender nut water taste: Very good Tender nut water: TSS - 4.8° Brix; Na - 22.40 ppm; K - 2150 ppm; Total sugars - 4.80 g/100 ml
Reaction to major diseases/ pests	Relatively tolerant to root (wilt) disease and eriophyid mite attack. Susceptible to attock by rhinoceros beetle and red palm weevil.
Reaction to environmental stresses	Recommended for cultivation under irrigated condition.
Specific recommendations, for seed production	Controlled pollination of selected palms and seedling selection is recommended for production of breeder seed. For large scale seed production, seed gardens are to be established. Over 90 per cent of open pollinated progenies show similarity to parental palms and hence large scale planting material production will not be a constraint in area expansion.

#### Other pertinent information/references

Recommended for release: XIX AICRPP Group Meeting - 2009

Notification: Ministry of Agriculture (Department of Agriculture and Co-operation) S.O. 456(E) Dated July 16, 2012

Registration: PPV&FRA Reg.No: 818/2014 Extant

CPCRI, 2010. Annual Report 2009-10. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 150 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Craps Research Institute, Kasaragod, Kerala, India, 40 p.



# CARI C-1 Annapurna

National Identity	IND 099S
Institution responsible for developing variety	ICAR-Central Island Agricultural Research Institute, P.B. # 181, Port Blair - 744 101, Andaman and Nicobar Islands ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	-
Breeding method & Parentage	Selection from CPCRI accession IND 099, Niu Leka Dwarf population, introduced from Fiji in 1983 (EC 415217), conserved at World Coconut Germplasm Centre, Sipighat
Recommended	
Purpose	Dual purpose copra, tender nut
State/ecological region	Coconuf growing tracfs of Andaman Islands and Nicobar Island ecosystems
Yield performance in evalua	rtion trial (rain fed conditions)
Mean	52 nuts/palm/year; 9100 nuts/ha/year 12.74 kg copra/palm/year; 2.23 f copra/ha/year 8.23 kg oil/palm/year; 1.44 t oil/ha/year
Potential	110 nuts/palm/year; 19250 nuts/ha/year 26.95 kg copra/palm/year; 4.72 t copra/ha/year 17.41 kg oil/palm/year; 3.05 t oil/ha/year
Description of variety	
Morphological features	Habit: Dwarf with compact canopy, erect leaf tip, stout stem with prominently visible, very closely arranged leaf scars, giving unique intermittently constricted appearance to stem; greater degree of cross pollination, unlike other dwarf varieties.  Fruits: Green, large-size and oval shape; Fruit weight - 1521 g; Copra content - 245 g; Oil - 64.6%  Husked fruits: Round in shape  Seedlings: Green petiole; 12 month seedlings have 8-9 leaves, collar girth of 15 cm and height 84 cm
Flowering attributes	Flower initiation: 65 months after planting
Quality attributes	Tender nut water content: 470 ml Tender nut water taste: Good Tender nut water: TSS - 5.4° Brix; Na - 35.5 ppm; K - 2216 ppm; Total sugars - 5.12 g/100 ml; Amino acids - 1.48 mg/100 ml
Reaction to major diseases/ pests	No major pest and disease incidence observed under field conditions. However, this variety is moderately attocked by rhinoceros beetle, red palm weevil, scales and inflorescence moth.
Reaction to environmental stresses	Unlike most dwarf varieties, this variety performs well under rain fed conditions alsa.
Specific recommendations, for seed production	Controlled pollination of selected palms and stringent seedling selection is recommended for production of breeder seed.  For large scale seed production, seed gardens are to be established. Over 70 per cent of open pollinated progenies show similarity to parental palms.

#### Other pertinent information/references

Recommended for release: XXII AICRPP Group Meeting - 2013.

CARI. 2010. Annual Report 2009-2010. Central Agricultural Research Institute, Port Blair, Andaman's, India, 150 p.

M. Sankaron, V. Domodaran, D. R. Singh, R. C. Srivastava, T. Damodaran, I. Jai Sankar and B. Augustine Jerard. 2011. High yielding coconut varieties. *Indian Horticulture*, 56 (6): 25-27.



# CARI C-2 Surya

National Identity	IND 112S
Institution responsible for developing variety	ICAR-Central Island Agricultural Research Institute, P.B. # 181, Port Blair - 744 101, Andaman and Nicobar Islands ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragad 671 124, Kerola
Collaborating centre(s), if any	-
Breeding method & Parentage	Selection from CPCRI accession IND 112, Hari Papua Orange Dwarf population (EC 415230) introduced from French Polynesiain 1983, conserved at World Coconut Germplasm Centre, Sipighat
Recommended	
Purpose	Tender nut and ornamental
State/ecological region	Coconut growing tracts of Andaman Islands and Nicobar Island ecosystems and in landscaping
Yield performance in evalu	ation trial (rain fed conditions)
Mean	107 nuts/palm/year; 18725 nuts/ha/year 7.49 kg copra/palm/year; 1.31 t copra/ha/year 4.68 kg oil/palm/year; 0.82 t oil/ha/year
Potential	161 nuts/palm/year; 28175 nuts/ha/yeor 11.27 kg copra/palm/year; 1.97 t copra/ha/year 7.04 kg oil/palm/year; 1.23 t oil/ha/year
Description of variety	
Morphological features	Habit: Dwarf with slender stem, shorter drooping leoves, stem without bole Fruits: Orange (red-yellow), small-size and oval shape; Fruit weight - 410 g; Copra content - 70 g; Oil - 62.5% Husked fruits: Round in shape Seedlings: Orange (red-yellow) petiole; 12 month seedlings have 8-9 leaves, collar girth of 12 cm and height 98 cm
Flowering attributes	Flower initiation: 26-30 months after plonting; very early flowering 18 months after planting is also observed
Quality attributes	Tender nut water content: 154 ml Tender nut water taste: Very Good Tender nut water: TSS - 6.3° Brix; Na - 34.7 ppm; K - 2279 ppm; Total sugars - 4.54 g/100 ml; Amino acids - 1.52 mg/100 ml
Reaction to major diseases/ pests	No major pest and disease incidence observed under field conditions. However, the palms of this variety are attacked by rhinoceros beetle as well as red palm weevil.
Reaction to environmental stresses	The variety performs well under rain fed conditions.
Specific recommendations, for seed production	Controlled pollination of selected palms and stringent seedling selection is recommended for production of breeder seed.  For large scale seed production, seed gardens ore to be established. Over 90 per cent of open pollinated progenies show similarity to parental palms.

#### Other pertinent information/references

Recommended for release: XXII AICRPP Group Meeting - 2013 CARI. 2010, Annual Report 2009-2010. Central Agricultural Research Institute, Port Blair, Andaman's, India,

M. Sankaran, V. Damodoran, D. R. Singh, R. C. Srivastava, T. Damodaran, I. Jai Sankar and B. Augustine Jerard. 2011. High yielding coconut varieties. Indian Horticulture, 56 (6): 25-27.



# CARI C-3 Omkar

National Identity	IND 1028
Institution responsible for developing variety	ICAR-Central Island Agricultural Research Institute, P.B. # 181, Port Blair - 744 101, Andaman and Nicobar Islands ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kosaragod 671 124, Kerala
Collaborating centre(s), if any	-
Breeding method & Parentage	Selection from CPCRI accession IND 102, Niu Oma Yellow Dwarf population (EC 415220), introduced from American Samoa in 1983, conserved at World Coconut Germplasm Centre, Sipighat
Recommended	
Purpose	Ornamental
State/ecological region	Coconut growing tracts of Andaman Islands and Nicobar Island ecosystems and in landscape gardening
Yield performance in evalua	ation trial (rain fed conditions)
Mean	113 nuts/palm/year; 19775 nuts/ha/year 8.31 kg copra/palm/year; 1.45 t copra/ho/year 5.36 kg oil/palm/year; 0.94 t oil/ha/year
Potential .	170 nuts/palm/year; 29750 nuts/ha/year 12.5 kg copra/polm/year; 2.18 t copra/ha/year 8.06 kg oll/palm/year; 1.41 t oll/ha/year
Description of variety	
Morphological features	Habit: Dwarf with slender stem, shorter drooping leaves, stem without bole at the base Fruits: Yellow, small-size, pear shape; Fruit weight - 432 g; Copra content - 74 g; Oil - 64.5%; Husk fibres are firm and husking the matured dry fruits is difficult. Husked fruits: Round in shape Seedlings: Yellow petiole; 12 month seedlings have 5-6 leoves, collar girth of 12 cm and height 55 cm
Flowering attributes	Flower initiation: 40 months after planting
Quality attributes	Tender nut water content: 117 ml Tender nut water taste: Very Good Tender nut water: TSS - 5.7° Brix; Na - 31.05 ppm; K - 2133 ppm; Total sugars - 4.62 g/100 ml; Amino acids - 1.44 mg/100 ml
Reaction to major diseases/ pests	No major pest and disease incidence observed under field conditions. However, the palms of this variety are attacked by rhinoceros beetle as well as red palm weevil.
Reaction to environmental stresses	The voriety performs well under rain fed conditions.
Specific recommendations, for seed production  Other pertinent information/	Controlled pollination of selected palms and stringent seedling selection is recommended for production of breeder seed.  For large scale seed production, seed gardens are to be established. Over 80 per cent of open pollinated progenies show similarity to parental palms. The seed nuts are to be sown immediately as the nut water is very less in matured fruits.

#### Other pertinent information/references

Recommended for release: XXII AICRPP Group Meeting - 2013 CARI. 2010. Annual Report 2009-2010. Central Agricultural Research Institute, Port Blair, Andaman's, India,

M. Sankaran, V. Damodaran, D. R. Singh, R. C. Srivastava, T. Damodaran, I. Jai Sankar and B. Augustine Jerard. 2011. High yielding coconut varieties. Indian Horticulture, 56 (6): 25-27.



# **CARI C-4 Chandan**

National Identity	IND 116S
Institution responsible for developing variety	Central Island Agricultural Research Institute, P.B. # 181, Part Blair - 744 101, Andaman and Nicobar Islands ICAR-Central Plantatian Craps Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	-
Breeding method & Parentage	Selectian fram CPCRI accession IND 116, Nikkore Orange Dwarf (EC 415234) papulatian, introduced fram Papua New Guinea in 1983, conserved at Warld Cacanut Germplasm Centre, Sipighat
Recommended	
Purpose	Ornamental
State/ecological region	Caconut grawing tracts of Andaman Islands and Nicobar Island ecosystems and in landscape gardening
Yield performance in evaluation	uation trial (rain fed conditions)
Mean	98 nuts/palm/year; 17150 nuts/ha/year 9.96 kg copra/palm/year; 1.74 t copra/ha/year 6.57 kg oil/palm/year; 1.15 t oil/ha/year
Potential	156 nuts/palm/year; 27300 nuts/ha/year 15.85 kg copra/palm/year; 2.77 t copra/ha/year 10.46 kg oil/palm/year; 1.83 t oil/ha/year
Description of variety	
Morphological features	Habit: Dwarf with slender stem, sharter leaves. No bale at the base of the stem Fruits: Cluster bearing, deep arange, small-size, aval shape; Fruit weight - 545 g; Capra cantent - 101.6 g; Oil - 66%; Husk fibres are firm making husking the matured dry fruits difficult. Husked fruits: Raund in shape Seedlings: Orange petiale; 12 month seedling have 5-6 leaves, callar girth af 12 cm and height 61 cm, very early splitting af leaves at 3rd ar 4th leaf stage
Flowering attributes	Flower initiation: 30 months after planting
Quality attributes	Tender nut water content: 198 ml Tender nut water taste: Very Gaad Tender nut parameters: TSS - 4.9° Brix; Na - 35.27 ppm; K - 2651 ppm; Tata sugars - 4.76 g/100 ml; Amina acids - 1.44 mg/100 ml
Reaction to major diseases/ pests	No major pest and disease incidence observed under field conditions. However, this variety is moderately attacked by rhinoceros beetle as well as red palm weevil.
Reaction to environmental stresses	The variety performs well under rain fed conditions also.
Specific recommendations, for seed production	Cantrolled pollination of selected palms and stringent seedling selection is recommended for production of breeder seed.  For large scale seed production, seed gardens are to be established Over 70 per cent of open pollinated progenies show similarity to parenta palms. The seed nuts are to be sown immediately as the nut water is very less in matured fruits.

#### Other pertinent information/references

Recommended for release: XXII AICRPP Group Meeting - 2013 CARI. 2010. Annual Report 2009-2010. Central Agricultural Research Institute, Part Blair, Andaman's, India,

M. Sankaran, V. Damodaran, D. R. Singh, R. C. Srivastava, T. Damodaran, I. Jai Sankar and B. Augustine Jerard. 2011. High yielding coconut varieties. Indian Horticulture, 56 (6): 25-27.



# **KALPARAKSHA**

National Identity	CPCRI Coconut Selection - 7 (CCS-7)
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regional Station, Kayamkulam, Alappuzha District, Kerala
Collaborating centre(s), if any	ICAR-Central Plantation Crops Research Institute, Kasaragod
Breeding method & Parentage	Evaluation and Selection. Selection from IND 049 Malayan Green Dwarf population (EC 548006) from Malaysia, acquired during 1960
Recommended	
Purpose	High yielding variety with resistance to roat (wilt) disease, Dual purpose- copra and tender nut
State/ecological region	Kerala and root (wilt) disease affected tracts.
Yield performance in evalua	tion trial (root wilt disease tracts)
Mean	65 nuts/palm/year; 11375 nuts/ha/year 11.94 kg copra/palm/year; 2.11 t copra/ha/year 7.83 kg oil/palm/year; 1.4 t oil/ha/year 87 nuts/palm/year; 15225 nuts/ha/year (disease free tracts, rain fed conditions)
Potential	77 nuts/palm/year; 13475 nuts/ha/year 14.26 kg copra/palm/year; 2.5 t copra/ha/year 9.34 kg oil/palm/year; 1.63 t oil/ha/year 101 nuts/palm/year; 17675 nuts/ha/year (disease free condition)
Description of variety	
Morphological features	Habit: Semi Tall, circular canopy, drooping leaf tip, stem without bole. Fruits: Green, medium-size and round shape; Fruit weight - 963.90 g; Copra content - 185.2 g; Oil - 65.5% Dehusked fruits: Oval in shape Seedlings: Green petiole; 12 month seedlings have 8-9 leaves, collar girth of 12.6 cm and height 157 cm
Flowering attributes	Flower initiation: 54 months after planting
Quality ottributes	Tender nut water content: 290 ml Tender nut water tasté: Very good Tender nut parameters: Na - 19.50 ppm; K - 2100 ppm; Total sugars -4.29 g/100 ml
Reaction to major diseoses/ pests	No major pest ottack observed in field conditions. However, under large-scale plantings precaution is advised against red palm weevil incidence.
Reaction to environmental stresses	Performs well under irrigated conditions.
Specific recommendations, for seed production	Controlled pollination of selected palms ond seedling selection is recommended for production of breeder seed. For large scale seed production, seed gardens are to be established.

#### Other pertinent information/references

Recommended for releose: XVIII AICRPP Group Meeting-2007

Notification: Ministry of Agriculture (Department of Agriculture and Co-operation) S.O. 1714(E) Dated July 18, 2008.

Registration - PPV&FRA Reg.No: 761/2014 Extant

CPČRI. 2008. Annual Report 2007-08. Centrol Plontation Crops Research Institute, Kosaragod, Keralo, India, 110 p.

R. V. Nair, R. J. Thomas, P. M. Jacob and George V. Thomas, 2009. Kalparaksha, a new coconut variety, resistant to root (wilt) disease. *Indian Coconut* 52(5): 14 - 16.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.



# KALPA HARITHA

National Identity	IC 599688
Institution responsible for developing variety	ICAR-Central Plantatian Crops Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	ICAR-Central Plantatian Crops Research Institute, RC, Kidu
Breeding method & Parentage	Selectian fram CPCRI accessian IND 045, an indigenaus accessian callected from Kulasekharam, Tamil Nadu
Recommended	
Purpose	Dual purpose - copra and tender nut
State/ecological region	Cocanut growing tracts of Kerala and Karnataka
Yield performance in evalua	ation trial (rain fed conditions)
Mean	118 nuts/palm/year; 20886 nuts/ha/year 21.25 kg capra/palm/year; 3.72 t capra/ha/yeor 14.13 kg oil/palm/year; 2.47 t oil/ha/year
Potential	205 nuts/palm/year; 36350 nuts/ha/year 36.91 kg/palm/year; 6.56 t capra/ha/year 24.55 kg/palm/year; 4.30 t ail/ha/year
Description of variety	
Morphological features .	Habit: Tall with spherical canapy, intermediate leaf tip and stem having slight bole at the base Fruits: Green, medium size and oval in shape; Fruit weight - 914 g; Capra content - 180-216 g; Oil - 66.5% Dehusked fruits: Round in shape Seedlings: Vigouraus, green petiole; 12 month seedlings have 9 leaves, collar girth of 17 cm and height 160 cm
Flowering attributes	Flower initiation: 45 months after planting
Quality attributes	Tender nut water content: 440 ml Tender nut water taste: Very good Tender nut water: TSS - 5.85° Brix; Na - 17.5 ppm; K -2100 ppm
Reaction to major diseases/ pests	Lesser incidence of eriophyid mite infestation No major disease/pest attacks observed under field canditions
Reaction to environmental stresses	Relatively tolerant to moisture stress and performs well under rainfed conditions
Specific recommendations, for seed production	Inter se mating between selected palms and seedling selection recammended for production of breeder seeds.  For large scale seed production, seed gardens to be established by planting the palms in blocks to facilitate natural mating.

#### Other pertinent information/references

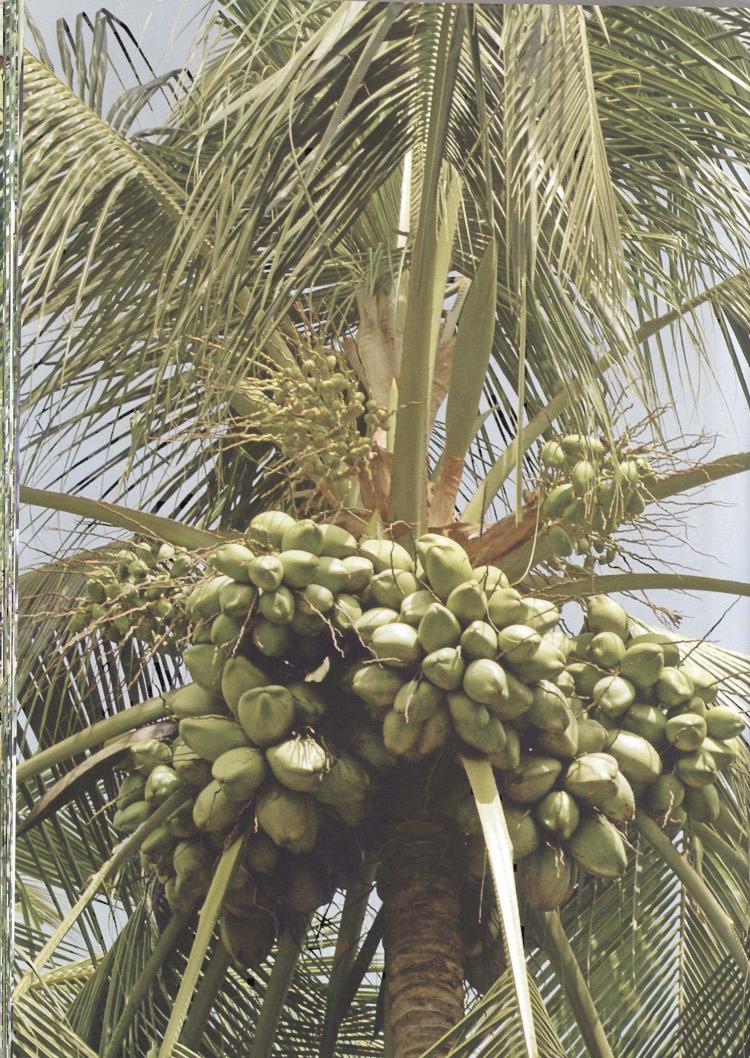
Recommended for release: XXI AICRPP Group Meeting - 2012

Notification: Awaited, Approved in the 23rd CVRC for Harticultural Crops - 2014

Registration - Under consideration with PPV&FRA

CPCRI. 2013. Annual Report 2012-13. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 116 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.



# CHANDRA KALPA

National Identity	IC 430669
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod 67 } 124, Kerala
Collaborating centre(s), if any	All India Co-ordinated Research Project on Palms, Coconut Research Station: Ambajipeta, Andhra Pradesh; Pilicode, Kerala; Rotnagiri, Maharashtra and Veppankulam, Tamil Nadu
Breeding method & Parentage	Selection and evaluation. Selection from IND 008, indigenous tall coconut population from Lakshadweep Island.
Recommended	
Purpose	Copra and oil.
Stote/ecological region	Kerala, Karnataka, Andhra Pradesh, Maharashtra and Tamil Nadu.
Yield performance in evalua	tion trial (rain fed conditions)
Mean	100 nuts/palm/year; 17700 nuts/ha/year 17.6 kg copra/palm/year; 3.12 t copra/ha/year 12.67 kg oil/palm/year; 2.24 t oil/ha/year
Potential	136 nuts /palm/year; 23800 nuts/ha/year 23.94 kg copra/palm/year; 4.19 t copra/ha/year 17.23 kg oil/palm/year; 3.02 t oil/ha/year
Description of variety	
Morphological features	Habit: Tall with spherical canopy, intermediate leaf tip, slight bole at base of stem Fruits: Greenish yellow to yellow-green, small-sized and oblong/ angular in shape with three prominent ridges; Fruit weight - 800 g; Copra content - 176 g; Oil - 72% Dehusked fruits: Oblong in shape Seedlings: Brown petiole; 12 month seedlings have 8 leaves, collar girth of 11.4 cm and height 170 cm
Flowering attributes	Flower initiation: 64 months after planting, under rain fed conditions
Quality attributes	Tender nut water content: 285 ml Tender nut water taste: Good Tender nut water: Na - 50 ppm; K - 2762 ppm; Total sugars- 4.2 g/100 ml
Reaction to mojor diseases/ pests	Susceptible to root (wilt) disease.
Reaction to environmental stresses	The variety is tolerant to moisture stress and recommended for water limited conditions.
Specific recommendations , far seed production	Inter se mating between selected palms and seedling selection recommended for production of breeder seeds.  For large scale seed production, seed gardens to be established by planting the palms in blocks to facilitate natural mating.

#### Other pertinent information/references

Recommended for release: VII AICRPP Group Meeting - 1985 AICRPP. 1986. AICRP on Palms Annual Report 1985-1986. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 114 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J Thomas and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragad, Kerala, India, 40 p.



# KERA CHANDRA

National identity	IND 0148
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Colloborating centre(s), if any	
Breeding method & Parentage	Selection from germplasm accession Philippines Ordinary Tall acquired in the year 1939 (EC 548011) and underwent over 56 years of evaluation and selection
Recommended	
Purpase	High yield, dual purpose for copra and tender nut.
State/ecological region	West Coast <i>viz</i> , Coastal Kerala, Karnataka, and Konkan Region, Eost Coast of Andhra Pradesh and West Bengal
Yield performance in evalue	ation trial (rain fed conditions)
Mean	110 nuts/palm/year; 19470 nuts/ha/year 20.79 kg copra/palm/year; 3.68 t copra/ha/year 13.72 kg oil /polm/year; 2.43 t oil/ha/year
Potential	140 nuts/palm/year; 24500 nuts/ha/year 26.46 kg copra/palm/year; 4.63 t copra/ha/year 17.46 kg oil /palm/year; 3.06 t oil/ha/year
Description of variety	
Morphological features	Habit: Tall with spherical canopy, intermediate leaf tip and slight bole at the base. Fruits: Green, large-size and round shape; Fruit weight - 1031 g; Copra content - 189 g; Oil - 66% Dehusked fruits: Round in shape Seedlings: Green petiole; 12 month seedlings have 8-9 leaves, collar girth of 12.3 cm and height 183.9 cm
Flowering attributes	Flower initiation: 60 months after plonting
Quality attributes	Tender nut water content: 450 ml Tender nut water taste: Very good Tender nut water: TSS - 6° Brix; Na - 24 ppm; K - 2273 ppm; Total sugars - 5.86 g/100 ml
Reaction to major diseases/ pests	No major disease attacks observed under field conditions. Relatively tolerant ta root (wilt) disease. Observed to harbor significantly lesser incidence of root burrowing nematodes.
Reaction ta environmental stresses	Has relatively more maisture stress talerance
Specific recommendations, for seed production	Cantrolled pallination of selected palms and seedling selection is recommended for production of breeder seed.  For large scale seed production, seed gardens are to be established by planting the palms in blacks.

#### Other pertinent information/references

Recommended for release: XII AICRPP Group Meeting - 1995

Registration: Under consideration with PPV & FR Authority

CPCRI. 1996. Annual Report 1995-96. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 220 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thamas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.



## KALPA PRATIBHA

National Identity	CPCRI Coconut Selection - 4 (CCS-4)
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	AlCRP on Palms Coconut Research Station: Aliyarnagar, Tamil Nadu; Ambajipeta, Andhra Pradesh; Ratnagiri, Maharashtra
Breeding method & Parentage	Selection and evaluation. Selection from CPCRI accession IND 016, Cochin China Tall (EC 415201) introduced from Vietnam in 1940.
Recommended	
Purpose	High yield, dual-purpose - capra and tender nut.
State/ecological region	Coconut growing tracts of Kerala, Tamil Nadu, Andhro Pradesh and Maharashtra.
Yield performance in evalua	ation trial (rain fed conditions)
Mean .	91 nuts/palm/year; 16107 nuts/ha/year 23.25 kg copra/palm/year; 4.12 t copra/ha/year 15.5 kg oil/palm/year; 2.73 t oil/ha/year
Potential	131 nuts/palm/year; 23275 nuts/ha/year 33.58 kg copra/palm/year; 5.97 t copra/ha/year 22.56 kg oil/palm/year; 4.01 t oil/ha/year
Description of variety	
Morphalogical features	Habit: Tall with compact, spherical canopy. Fruits: Green, large size and round shape; Fruit weight - 1332 g; Copra content - 256.37 g; Oil - 67% Dehusked fruits: Round shape Seedlings: Green petiole; 12 month seedlings have 9 leaves, collar girth of 15.11 cm and height 213 cm
Flowering attributes	Flower initiation: 71 months after planting, under rain fed conditions
Quality attributes	Tender nut water content: 448 ml Tender nut water taste: Good Tender nut water: Na - 21.7 ppm; K - 2150 ppm; Total sugars - 5.56 g/100 ml
Reaction to major diseases/ pests	No major disease and pest attacks observed under field canditions.
Reaction to environmental stresses	Relatively tolerant to moisture stress.
Specific recommendations, for seed production	Inter se mating between selected palms and seedling selection recommended for production of breeder seeds.  For large scale seed production, seed gordens to be established by planting the palms in blocks to facilitate natural mating.

#### Other pertinent information/references

Recommended for release: XVIII AICRPP Group Meeting - 2007

Notification: Ministry of Agriculture (Department of Agriculture and Co-operation) S.O. 1714(E) Dated July 18, 2008.

Registration: PPV&FRA Reg. No: 830/2014 Extant

CPCRI. 2008. Annual Report 2007-08. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 110 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas ond George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin Na. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.







CRI Coconut Selection - 5 (CCS-5)  R-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod 671  I, Kerala  India Co-ordinated Research Project on Palms, Coconut Research tion, Mondouri (BCKV), West Bengal.  ection from CPCRI accession IND 022, population of Java Tall (EC 8004), originally introduced fram Indonesia in 1947.
I, Kerala India Co-ordinated Research Project on Palms, Coconut Research tion, Mondouri (BCKV), West Bengal.  ection from CPCRI accession IND 022, population of Java Tall (EC
tion, Mondouri (BCKV), West Bengal.  ection from CPCRI accession IND 022, population of Java Tall (EC
ora and oil. Also suitable for ball copra production.
ala and West Bengal.
trial (rain fed conditions)
nuts/palm/year; 13973 nuts/ha/year 25 kg copra/palm/yeor; 3.37 † copra/ha/year 80 kg oil/palm/year; 2.24 † oil/ha/year
o nuts/palm/year; 22429 nuts/ho/year 37 kg copra/palm/year; 5.41 t copra/ha/yeor 19 kg oil/palm/year; 3.60 t oil/ha/yeor
oit: Tall with stout trunk, spherical canopy, intermediate leof tip and with minent bale at the base ts: Yellowish green, large size and oval shape; Fruit weight - 1001.19 g; pra content – 241.14 g; Oil - 66.50% husked fruits: Round in shape edlings: Green petiole; 12 month seedlings have 7-8 leaves, collar girth 11 cm and height 181 cm
wer Initiation: 77 manths after planting under rain fed conditions
der nut water content: 495 ml der nut water taste: Averoge der nut water: Na - 23.5 ppm; K - 2150 ppm; Total sugars - 5.7 g/100 ml
majar pest and disease attacks observed under field conditions.
variety is relatively tolerant to moisture stress and recommended for ter limited conditions.
ntrolled pollination of selected palms and seedling selection is ommended for production of breeder seed. large scale seed production, seed gordens to be established by planting polms in blocks.

#### Other pertinent information/references

Recommended for release: XVIII AICRPP Group Meeting - 2007

Notification: Ministry of Agriculture (Department of Agriculture and Co-operation) S.O. 1714(E) Dated July 18, 2008.

Registration: PPV&FRA Reg. No: 832/2014 Extont

CPCRI. 2007. Annual Report 2007-08. Central Plantation Crops Research Institute, Kasaragod, Kerola, India, 110 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.





National Identity	CPCRI Caconut Selectian - 6 (CCS-6)
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Kudlu Past, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	All India Co-ardinated Research Project an Palms, Cacanut Research Station: Aliyarnagar, Tamil Nadu;
Breeding method & Parentage	Selection from CPCRI accession IND 006, Andaman Giant Tall population, callected fram Andaman and Nicobar Island in 1940
Recommended	
Purpose	High yield, copra and ail.
State/ecological region	Coconut growing tracts of Kerala, Tamil Nadu, Andaman and Nicabal Islands.
Yield performance in evalua	ation trial (rain fed conditions)
Mean	86 nuts/palm/year; 15012 nuts/ha/year 20.81 kg copra/palm/year; 3.66 t copra/ha/year 13.63 kg oil/palm/year; 2.40 t oil/ha/year
Potential	128 nuts/palm/year; 22794 nuts/ha/year 31.23 kg copra/palm/year; 5.56 t copra/ha/year 20.46 kg oil/palm/year; 3.64 t oil/ha/year
Description of variety	
Morphological features	Habit: Tall ond robust with gigantic appearance. Fruits: Green, large size ond ovol shape; Fruit weight - 1381 g; Copra content - 243.93 g; Oil - 65.5% Dehusked fruits: Oval in shape Seedlings: Green petiole; 12 month seedlings have 7-8 leoves, collar girth of 13.9 cm and height 197 cm
Flowering ottributes	Flower initiation: 67 months after planting, under rainfed conditions
Quality attributes	Tender nut water content: 290 ml Tender nut water taste: Average Tender nut woter: Na - 24.6 ppm; K - 2650 ppm; Total sugars - 4.92 g/100 m
Reaction to major diseoses/ pests	No mojor diseose and pest ottacks observed under field conditions.
Reaction to environmental stresses	Relatively tolerant to moisture stress.
Specific recommendations, for seed production	Controlled pollination of selected palms and seedling selection is recommended for production of breeder seed. For large scale seed production, seed gardens to be established by plonting the palms in blocks.

Recommended for release: XVIII AICRPP Group Meeting - 2007

Notification: Ministry of Agriculture (Department of Agriculture and Co-operation) S.O. 1714(E) Dated July 18, 2008

Registration: PPV&FRA Reg. No: 828/2014 Extant

CPCRI. 2008. Annual Report 2007-08. Centrol Plontation Crops Research Institute, Kasoragod, Kerola, India, 110 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomos and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasoragod, Keralo, India, 40 p.





National Identity	IC 591017
Institution responsible for	All India Co-ordinated Research project on Palms, ICAR-CPCRI, Kasaragod
developing variety	671124, Kerala.
Collaborating centre(s), if any	ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod
	671 124, Kerala All India Co-ordinated Research Project on Palms, Coconut Research
	Station: Arsikere, Karnataka and Aliyarnagar, Tamil Nadu.
Breeding method & Parentage	Selection from accession IND 125, collected from Tiptur coconut population. The seedlings raised from the selected mother palms at HRS, Arsikere were used for evaluation at Arsikere and Aliyarnagar. Selection from IND 125 raised from <i>inter</i> se moted nuts of the selected palms was evaluated at CPCRI Kasaragod.
Recommended	
Purpose	High yield, oil, ball copra.
State/ecological region	Rain fed and irrigated regions of Karnataka, Tamil Nadu and Kerala (other than root wilt affected regions).
Yield performance in evalua	ition trial (rain fed conditions)
Mean	117 nuts/palm/year; 20709 nuts/ha/year 20.50 kg copra/palm/year; 3.59 t copra/ha/yeor
D-t#-I	13.96 kg oil/palm/year; 2.45 t oil/na/year
Potential	149 nuts/palm/year; 26075 nuts/ha/year   26.08 kg copra/palm/year;4.56 t copra/ha/year   17.78 kg oil/palm/year; 3.11 t oil/ha/year
Description of variety	
Morphological features	Habit: Tall, circular crown with intermediate leaf tip. Fruits: Brown/Brown green, medium size and oval shape; Fruit weight - 958 g; Copra content - 175 g; Oil - 68.2% Dehusked fruits: Round in shape Seedlings: Brown petiole; 12 month seedling have 7-8 leoves, collar girth of 10.93 cm and height 169 cm
Flowering attributes	Flower initiation: 72 months after planting under rain fed conditions.
Quality attributes	Tender nut water content: 265 ml Tender nut water taste: Good Tender nut water: TSS - 5.8° Brix; Na - 60 ppm; K - 3200 ppm; Totol sugars - 5 g/100 ml; Amino acid - 2.9 mg/100 ml.
Reaction to major diseases/ pests	No major disease and pest attacks observed under field conditions. This variety is relatively tolerant to basal stem rot and leaf blight.
Reactian to environmental stresses	This variety shows better performance under rain fed conditions, with higher nut and copra yield and hence is recommended for cultivation in water limited conditions.
Specific recommendations , for seed production	Inter se mating of selected palms followed by seedling selection is recommended for breeder seed production. However, establishment of seed gardens of this variety is necessory for large scale planting material production.

Recommended for release: XIX AICRPP Group Meeting - 2009

Notification: Ministry of Agriculture (Department of Ağriculture and Co-operation) S.O. 2277 (E) dated August 17, 2015.

Registration - Under consideration with PPV&FRA
CPCRI, 2010. Annual Report 2009-10. Centrol Plantotion Crops Research Institute, Kasaragod, Kerala, India, 148 p.
Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas, 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.



# KERA KERALAM

National Identity	CPCRI Coconut Selection - 9 (CCS-9)
Institution responsible for developing variety	All India Co-ordinated Research project on Palms, ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	ICAR-Central Plantation Crops Research Institute, Kasoragod; All India Co-ordinated Research Project on Palms, Coconut Research Station: Veppankulom and Aliyornagar, Tamii Nadu; Mondouri, West Bengal
Breeding method & Parentage	Selection from CPCRI accession IND 069, a population of West Coast Tall from Kerola.
Recommended	
Purpose	Copra and oil, also suitable for ball copra production.
State/ecological region	Keralo, Tamil Nadu and West Bengal.
Yield performance in evalua	ation trial (rain fed conditions)
Mean	109 nuts/palm/year; 19075 nuts/ha/year 19.18 kg copra/palm/year; 3.36 t copra/ha/year 13.05 kg oil/palm/year; 2.28 t oil/ha/year 147 nuts/palm/year; 25.87 kg copra/palm/year; 17.59 kg oil/palm/year (under irrigation) 26019 nuts/ha/year; 4.53 t copra/ha/year; 3.08 t oil/ha/year (under irrigation)
Potential	213 nuts/palm/year; 37275 nuts/ha/year 37.49 kg copra/palm/year; 6.56 t capra/ha/year 25.49 kg oil/palm/year; 4.46 t oil/ha/year
Description of variety	
Morphologicol features	Habit: Tall with spherical canopy, intermediate leaf tip and stem with bole at the base Fruits: Green yellow, large size and oval shape; Fruit weight –800-900 g; Copra content - 176 g; Oil - 68% Dehusked fruits: Oval in shape Seedlings: Brown petiole; 12 manth seedlings have 7 leaves, collar girth of 11.3 cm and height 167.5 cm
Flowering attributes	Flower initiation: 70 months after planting, under rain fed conditions; 48-58 manths after planting, under irrigated conditions.
Quality attributes	Tender nut water content: 341 ml Tender nut water taste: Average Tender nut water: TSS - 6.3° Brix; Na - 29 ppm; K - 2421 ppm; Total sugars - 5.5 g/100 ml; Amino acid - 2.41 mg/100 ml
Reaction to major diseases/ pests	No major disease and pest attacks observed under field conditions. The variety is moderately resistant to leaf spot disease and susceptible to damage by eriophyid mite.
Reaction to environmental stresses	The variety is moderately tolerant to moisture stress and recommended for cultivation in water limited conditions.
Specific recommendations, far seed production	Inter se mating of selected palms followed by seedling selection is recommended for breeder seed production. Establishment of seed gardens of this variety is necessary for large scale planting material production.

## Other pertinent information/references

Recommended for release: XVIII AICRPP Group Meeting - 2007

Notification: Ministry of Agriculture (Department of Agriculture and Co-operation) S.O. 1979(E) dated August 12, 2010.

CPCRI, 2008. Annual Report 2007-08. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 110 p.

AICRPP. 2008. AICRP on Palms Annual Report 2007-08. Central Plantation Crops Research Institute, Kasaragod,

Kerala, India, 109 p.
Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.



# KERA BASTAR

National Identity	CPCRI Coconut Selection - 10 (CCS-10)
Institution responsible for developing variety	All India Co-ordinated Research Project on Palms, ICAR-Central Plantation Crops Research Institute, Kudlu Past, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	ICAR-Central Plantation Crops Research Institute, Kasaragod; All India Coordinated Research Project on Palms, Cocanut Research Station: Jagdalpur, Chhattisgarh; Ambajipeta, Andhra Pradesh; Veppankulam, Tamil Nadu; Ratnagiri, Maharashtra
Breeding method & Parentage	Selection from CPCRI accession IND 004 (EC 548016), a cocanut population from Fiji, introduced during the year 1939.
Recommended	
Purpose	High yield, wide adaptability.
State/ecological region	The variety is suited for Bostar region of Chhattisgarh, coastal zone of Tamil Nadu and Andhra Pradesh, Kankan region at Maharashtra.
Yield performance in evalua	tion trial (rain fed conditions)
Mean	110 nuts/palm/year; 19400 nuts/ha/year 19.80 kg copra/palm/year; 3.1 t copra/palm/year 13.60 kg oil/palm/year; 2.04 t oil/palm/year
Potential	135 nuts/palm/year; 23625 nuts/ha/year 37.49 kg copra/palm/year; 6.69 t copra/ha/year 25.49 kg oil/palm/year; 4.51 t oil/ha/year
Description of variety	
Morphological features	Habit: Tall with spherical canopy, stem with prominent bole at the base Fruits: Yellow green, large size and oval shape; Fruit weight –1162 g; Copra content – 160-172 g; Oil - 65.2% Dehusked fruits: Round in shape Seedlings: Green petiole, high girth more than 12 cm
Flowering attributes	Flower initiation: 72 months after planting, under rain fed conditions
Quality ottributes	Tender nut water content: 332 ml Tender nut water taste: Average Tender nut water: TSS - 6.58° Brix; Na - 26 ppm; K - 2212 ppm; Total sugars - 6.2 g/100 ml; Amino acid 2.00 mg/100 ml
Reaction to major diseases/ pests	No major disease and pest attacks observed under field conditions. The variety is moderately susceptible to stem bleeding and bud rot. Mild infestation of eriophyid mite is recorded in this variety.
Reaction to environmental stresses	The variety has wide adaptability ond performs well in different agroecological zones.
Specific recommendations, for seed production	Inter se mating of selected palms followed by seedling selection is recommended for breeder seed production.  Establishment of seed gardens of this variety is necessary for large scale planting material production.

## Other pertinent information/references

Recommended for release: XVIII AICRPP Group Meeting - 2007

Notification: Ministry of Agriculture (Department of Agriculture and Co-operation) S.O. 1979(E) dated August 12, 2010.

CPCRI. 2008. Annual Report 2007-08. Central Plantation Crops Research Institute, Kosaragod, Kerala, India, 110 p.

AICRPP. 2008. AICRP on Palms Annual Report 2007-08. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 109 p.



# KALPA SHATABDI

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National Identity	IND 034S
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	AICRP on Palms Coconut Research Station: Aliyarnagar, Tamil Nadu
Breeding method & Parentage	Selection and evaluation. Selection from CPCRI accession IND 034, San Ramon Tall population (EC 548012) introduced from Philippines in 1955.
Recommended	
Purpose	Large attractive fruits with high copra content and desirable tender nut traits, dual-purpose - copra and tender nut.
State/ecological region	Coconut growing tracts of Kerala, Karnataka and Tamil Nadu
Yield performance in evalua	ation trial
Mean	105 nuts/palm/year; 18375 nuts/ha/year 28.65g copra/palm/year; 5.01 t copra/ha/year 18.34 kg oil/palm/year; 3.21 t oil/ha/year
Potential	148 nuts/palm/year; 25900 nuts/ha/year 40.39 kg copra/palm/year; 7.07 t copra/ha/year 25.85 kg oil/palm/year; 4.52 t oil/ha/year
Description of variety	
Morphological features	Habit: Tall with compact, spherical canopy and slight bole at base. Stem stout with higher girth, closely arranged leaf scars  Fruits: Greenish yellow, large size and oval shape; Fruit weight - 1965 g; Copra content - 272.9 g; Oil - 64%  Husked fruits: Large, Round shape  Seedlings: Green petiole; 12 manth seedlings have 9-10 leaves, coilar girth of 16.89 cm and height 176.85 cm
Flowering attributes	Flower initiation: 72 months after planting, under rain fed conditions.
Quality attributes	Tender nut water content: 612 ml Tender nut water taste: Good Tender nut water: TSS - 6.2° Brix; Na - 26 ppm; K - 2745 ppm; Total sugars - 5.3 g/100 ml; Amino acids - 2.20 mg/100 ml
Reaction to major diseases/ pests	No major disease and pest attacks observed under field conditions. The palms of this selection recorded lesser incidence of rhinoceros beetle damage when compared to other accessions in the trial.
Reaction to environmental stresses	Relatively tolerant to moisture stress.
Specific recommendations, for seed production	Inter se mating between selected palms and seedling selection recommended for production of breeder seeds.  For large scale seed production, seed gardens to be established by planting the palms in blocks to facilitate natural mating.

## Other pertinent information/references

Recommended for release: ICAR-CPCRI Centenary year, XXV AICRPP Group Meeting – 2016 ICAR-CPCRI, 2016, KALPA CPCRI Newsletter 35 (2) April-June 2016, Central Plantation Crops Research Institute, Kasaragod, Kerala, India, pp. 2.



# KALPA SRESHTA

National Identity	IC 611072
Institution responsible for developing variety	ICAR-Central Plantation Craps Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	All India Co-ordinated Research Project on Palms, Caconut Research Station, Arsikere, Karnataka.
Breeding method & Parentage	Selection and Hybridization: Selection from IND 058 (Malayan Yellow Dwarf) used as female parent and selection from IND 125 (Tiptur Tall) used as male parent.
Recommended	
Purpose	Dual purpose - copra and tender nut
State/ecological region	Cocanut growing tracts of Kerala and Karnataka
Yield performance in evalua	tion trial (irrigated conditions)
Mean	167 nuts/palm/year; 29227 nuts/ha/year 35.90 kg copra/palm/year; 6.28 t capra/ha/year 23.02 kg oil/palm/year; 4.49 t oil/ha/year
Potential	186 nuts/palm/year; 32550 nuts/ha/year 40.18 kg capra/palm/year; 7.03 t capra/ha/year 25.71 kg oil/palm/year; 4.50 t oil/ha/year
Description of variety	
Morphological features	Habit: Tall, circular crawn, stem without prominent bole. Fruits: Green and aval shape; Fruit weight - 940 g; Copra content - 216 g. Oil – 64.1% Dehusked fruits: Round in shape Seedlings: Vigourous, green petiole, high girth mare than 12 cm
Flowering attributes	Flower initiation: 48 months after planting under irrigated conditions and 72 months after planting, under rain fed conditions.
Quality attributes	Tender nut water content: 368 ml Tender nut water taste: Gaod Tender nut water: TSS - 5.89° Brix; Na - 33.3 ppm; K - 2081 ppm; Tatal sugars - 5.81 g/100 ml; Amino acids - 1.34 mg/100 ml
Reaction to major diseases/ pests	Na major pest attacks abserved under field conditions. However, this variety is susceptible to grey leaf blight and moderately susceptible to stembleeding.
Reaction to environmental stresses	The hybrid performs well under irrigated conditions.
Specific recommendations, for seed production	Emasculation and artificial pallination in female parent, followed by hybrid seedling selection is recommended for production of quality hybric seedlings.  For large scale hybrid seed production, seed gardens are to be established by planting both the parents in a suitable manner to facilitate natural hybrid seed production.

# Other pertinent information/references

Recommended for release: XXIII AICRPP Group Meeting - 2014

Notification: Awaited. Approved in 24th CVRC for Harticultural Crops - 2015 CPCRI. 2015. Annual Report 2014-15. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 124 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasoragod, Kerala, India, 40 p.





National Identity	IC 574568
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod 671 124, Kerala
Colloborating centre(s), if any	All India Co-ordinated Research Project on Palms, Coconut Research Station, Kahikuchi, Assam
Breeding method & Parentage	Hybridization, with CPCRI accession IND 058S (Malayan Yellow Dwarf) as female parent and CPCRI accession IND 069S (West Coast Tall) as male parent.
Recommended	
Purpose	Dual purpose - copra and tender nut
State/ecolagical region	Coconut growing tracts of Kerala and Assam
Yield performance in evalua	ation trial (rain fed conditions)
Mean	117 nuts/palm/year; 20744 nuts/ha/year 25.72 kg copra/palm/year; 4.5 t copra/ha/year 17.33 kg oil/palm/year; 3.04 t oil/ha/year
Potential	141 nuts/palm/year; 24675 nuts/ha/year 30.94 kg copra/polm/year; 5.42 t copra/ha/year 20.89 kg oil/palm/year; 3.66 t oil/ha/year
Description of variety	
Morphological features	Habit: Semi-Tall with spherical canopy Fruits: Green, medium-size and oval shape; Fruit weight - 1032.33 g; Coprocontent - 219.46 g; Oil - 67.5% Dehusked fruits: Round in shape Seedlings: Vigourous, green petiole; 12 month seedling - 9 leaves, collar girth of 17.8 cm and height 164 cm
Flawering attributes	Flower initiation: 36-48 months after planting, under irrigated conditions and 58-60 months after planting, under rain fed conditions.
Quality attributes	Tender nut water content: 346 ml Tender nut water taste: Very good Tender nut water: TSS - 6.0° Brix; Na - 35.1 ppm; K - 2370 ppm; Totol sugars - 4.17 g/100 ml; Amino acids - 2.08 mg/100 ml
Reaction to major diseases/ pests	No major disease/pest attacks observed under field conditions
Reaction to environmental stresses	Relatively tolerant to moisture stress. Higher Nitrogen use efficiency observed in seedlings
Specific recommendations, for seed production	Emasculotion and artificial pollination in female parent, followed by hybrid seedling selection is recommended for production of quality hybrid seedlings.  For lorge scale hybrid seed production, seed gardens are to be established by plonting both the parents in a suitable manner to facilitate natural hybrid seed production.

Recommended for release: XIX AICRPP Group Meeting - 2009

Notification: Ministry of Agriculture (Department of Agriculture and Cooperation) S.O. 2277 (E) Dated August 17, 2015

Registration - Under consideration with PPV&FRA

CPCRI. 2010. Annual Report 2009-10. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 142 n

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.

B. Augustine Jerard, V. Niral, K. Samsudeen, R.V. Nair, C. Jayabose and George V. Thomas. 2015. Development of a Dwarf x Tall coconut hybrid 'Kalpa Samrudhi'. *Journal of Plantation Crops*, 43 (1): 46-52.





# KALPA SANKARA

National Identity	IC 591019
Institution responsible for developing variety	ICAR-Centrol Plontation Craps Research Institute, Regianal Statian, Kayamkulam, Alappuzha District, Kerala.
Collaborating centre(s), if any	
Breeding method & Parentage	Selection and Hybridizotion. Hybrid developed by moking crasses with parental lines of IND 029S (Chowghot Green Dworf) and IND 069S (West Coost Tall).
Recommended	
Purpose	Dual purpose - copra and tender nut; root (wilt) disease talerance.
State/ecological region	Root (wilt) disease prevalent areas.
Yield performance in evaluat	ion trial (root wilt disease tracts)
Mean	84 nuts/palm/year; 14868 nuts/ha/year 14.62 kg capra/palm/year; 2.50 t copra/ho/yeor 9.87 kg oil/palm/year; 1.69 t oil/ha/yeor
Potential	112 nuts/palm/yeor; 19600 nuts/ha/year 19.71 kg copra/palm/year; 3.45 t copra/ha/yeor 13.40 kg oil/palm/year; 2.35 t oil/ha/year
Description of variety	***************************************
Morphological features	Hobit: Semi tall with precocious bearing, circular canopy, intermediate leaf tip & without prominent bale of the base Fruits: Green, medium size and oval shape; Fruit weight - 839 g; Copro cantent - 170 g; Oil - 67.5% Dehusked fruits: Raund in shope Seedlings: Brown petiole; 12 month seedling have 7-9 leaves with high callar girth and height around 160 cm
Flowering attributes	Flower initiatian: 36-40 manths after planting.
Quality attributes	Tender nut water cantent: 375 ml Tender nut water taste: Good
Reaction to major diseases/ pests	No major disease ottacks abserved under field conditions. This variety is tolerant to roat (wilt) disease. Requires adequote plant, protection measures against major pests, particularly red polm weevil, when large-scale plantings are adopted.
Reaction to environmental stresses	The voriety is toleront to moisture stress ond gives better yield under rain fection conditions at formers' plats in the root (wilt) disease prevalent tracts.
Specific recommendations, for seed production	Emasculation and artificial pollination in female parent, followed by hybrid seedling selection is recommended far production af quality hybrid seedlings.  For large scale hybrid seed production, seed gardens are to be established by planting both the parents in a suitable manner to facilitate notural hybrid seed production.

#### Other pertinent information/references

Recommended for release: XIX AICRPP Group Meeting -2009

Notification: Ministry of Agriculture (Department of Agriculture and Ca-operation) S.O. 456(E) Dated July 16, 2012

Registration - PPV&FRA Reg. No: 814/2014 Extant

CPCRI. 2010. Annual Report 2009-10. Centrol Plontation Craps Research Institute, Kasaragod, Kerala, India, 148 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thamas. 2014. Caconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerola, India, 40 p.

Regi J. Thomas, Shareefa, M., Krishnakumar, V. and Chowdappa, P. 2014. Coconut varieties talerant to root (wilt) disease. *Indian Horticulture*, 59 (6): 28-29.



# CHANDRA LAKSHA

National Identity	IND 008S x IND 007S
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Kudlu Post, Kasaragod 67 1 124, Kerala
Collaborating centre(s), if any	
Breeding method & Parentage	Hybridization, with CPCRI accession IND 008S Laccadive Ordinary Tall as female parent and CPCRI accession IND 007S Chowghat Orange Dwarf as male parent.
Recommended	
Purpose	Dual purpose - copra and tender nut, High yield, moisture stress tolerance
Stote/ecological region	Coconut growing tracts of Kerala and Karnataka.
Yield performance in evalua	tion trial (rain fed conditions)
Meon	109 nuts/palm/year; 19293 nuts/ha/year 21.30 kg copra/palm/year; 3.76 t copra/ha/year 14.60 kg oil/palm/year; 2.50 t oil/ha/year
Potential	175 nuts/palm/year; 30625 nuts/ha/year 30.10 kg copra/palm/year; 5.27 t copra/ha/year 21.14 kg oil/palm/year; 3.37 t oil/ha/year
Description of variety	
Morphological feotures	Habit: Tall with circular canopy Fruits: Brown; oblong shape; Fruit weight - 1100 g; Copra content: 195 g; Oil - 69% Dehusked fruits: Oblong in shape Seedlings: Vigourous, brown petiole; 12 month seedling - 8-9 leaves, collar girth of 11.5 cm and height 173 cm
Flowering attributes	Flower initiation: 48 months after planting, under good management.
Quality attributes	Tender nut water content; 339 ml Tender nut water taste: Good Tender nut water: TSS - 6.51° Brix; Na - 23.83 ppm; K - 2226 ppm; Tota sugars - 5.72 g/100 ml; Amino acids - 1.76 mg/100 ml
Reaction to major diseases/ pests	No major disease/pest attacks observed under field conditions
Reaction to environmental stresses	This hybrid is tolerant to moisture stress and hence performs well even in water limited situations.
Specific recommendations, for seed production	Emasculation and artificial pollination in female parent, followed by hybrid seedling selection is recommended for production of quality hybrid seedlings.  For large scale hybrid seed production, hybrid seed gardens are to be established by planting both the parents in a suitable manner to facilitate natural hybrid seed production.

## Other pertinent information/references

Recommended for Release: VII AICRPP Group Meeting - 1985

AICRPP. 1986. AICRP on Palms Annual Report 1985-86. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 114 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.





National Identity	IND 069\$ x IND 007\$
Institution responsible for developing variety	ICAR-Centrol Plantation Crops Research Institute, Kudlu Post, Kasaragod 67 1 124, Keralo
Collaborating centre(s), if any	-
Breeding method & Parentage	Hybridization, with CPCRI accession IND 069S West Coast Tall as female parent and CPCRI accession IND 007S Chowghat Orange Dwarf as male parent.
Recommended	
Purpose	Copra and oil.
State/ecological region	Coconut growing tracts of Kerala, Karnataka, Coastal Maharashtra and Coastal Andhra Pradesh.
Yield performance in evalua	ition trial (rain fed conditions)
Meon	108 nuts/palm/year; 19116 nuts/ha/year 20.20 kg copra/palm/yeor; 3.78 t copra/ha/year 14.60 kg oil/palm/year; 2.40 t oil/ha/year
Potential	213 nuts/palm/year; 37824 nuts/ha/year 43.88 kg copra/palm/year; 7.80 t copra/ha/year 29.81 kg oil/palm/year; 5.30 t oil/ha/year
Description of variety	
Morphological features	Habit: Tall with circular canopy Fruits: Brown, Medium sized, Oval shape; Fruit weight - 850 g; Copra content: 187 g; Oil - 68% Dehusked fruits: Oval in shope Seedlings: Vigourous, Brown petiole; 12 month seedling - 8 leaves, collar girth of 11.9 cm and height 162 cm
Flowering attributes	Flower initiation: 3-4 years after planting, under good management and 5-6 years, under rain fed conditions.
Quality attributes	Tender nut water content: 351 ml Tender nut water taste: Good Tender nut water: TSS - 7.0° Brix; Na - 33.3 ppm; K - 2274 ppm; Total sugars - 6.61 g/100 ml; Amino acids 1.47 mg/100 ml
Reaction to major diseases/ pests	No major disease/pest attacks observed under field conditions. The variety is susceptible to root (wilt) disease, and moderately susceptible to stem bleeding and leaf spot.
Reaction to environmental stresses	Moisture stress toleront and suited for cultivation under water limited conditions.
Specific recommendations, for seed production	Emasculation and artificial pollination in female parent, followed by hybrid seedling selection is recommended for production of quality hybrid seedlings.  For large scale hybrid seed production, hybrid seed gardens are to be established by planting both the parents in a suitable manner to facilitate natural hybrid seed production.

Recommended for release: IX AICRPP Group Meeting - 1989

CPCRI. 1992. Annual Report 1991-92. Central Plantation Crops Research Institute, Kasaragod, Kerala, India,

188 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thamas and Gearge V. Thomas. 2014. Coconut Varieties and Hybrids, CPCRI Technical Bulletin No. 87. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 40 p.



# CHANDRA SANKARA

National Identity	IND 0075 x IND 0695
Institution responsible for developing variety	ICAR-Central Plantation Craps Research Institute, Kudlu Past, Kasaragod 671 124, Kerala
Collaborating centre(s), if any	
Breeding method & Parentage	Hybridization, with accession IND 007S (Chowghat Orange Dwarf) as female parent and accession IND 069S (West Coast Tall) as male parent
Recommended	
Purpose	High yield, dual purpose - copra and tender nut.
State/ecological region	Caconut growing tracts of Kerala, Karnataka and Tamil Nadu.
Yield performance in evalua	tion trial (rain fed conditions)
Mean	110 nuts/palm/year; 20532 nuts/ha/year 25 kg copra/palm/year; 4.27 t copro/ha/year 16.82 kg oil/palm/year; 2.99 t oil/ha/year
Potential	210 nuts/palm/year; 37300 nuts/ha/year 43.68 kg capra/palm/year; 7.74 t copra/ha/year 28.00 kg oil/palm/year; 4.95 t oil/ha/year
Description of variety	
Morphological features	Habit: Semi-Tall with circular canopy with intermediate leaf tip. Fruits: Brown, medium size and raund shape; Fruit weight - 1210 g; Capra content: 208-225 g; Oil - 64-68% Dehusked fruits: Round in shape Seedlings: Vigourous, brown (bronze calour) petiale; 12 month seedling have 9 leaves, collar girth of 11.7 cm and height 166 cm
Flowering attributes	Flower initiation: 36 manths after planting, under irrigated conditions.
Quality attributes	Tender nut water content: 347 ml Tender nut water taste: Good Tender nut water: TSS - 6.58° Brix; Na - 23.77 ppm; K - 2193 ppm; Tota sugars - 5.99 g/100 ml; Amino acids - 1.73 mg/100 ml
Reaction to major diseases/ pests	Na major disease/pest attacks observed under field conditions.
Reaction to environmental stresses	Susceptible to moisture stress and hence recommended for cultivation under irrigated conditions.
Specific recommendations , for seed production	Emasculation and artificial pallination in female parent, followed by hybrid seedling selection is recommended for production of quality hybrid seedlings.  For large scale hybrid seed production, hybrid seed gardens are to be established by planting both the parents in o suitable manner to facilitate natural hybrid seed production.

#### Other pertinent information/references

Recammended for release: VII AICRPP Group Meeting - 1985 Recommended for cultivation under good management

AICRPP. 1986. AICRP on Palms Annual Report 1985-86. Central Plantation Crops Research Institute, Kasaragod,

Kerala, India, 114 p.

Niral, V., B. Augustine Jerard, Samsudeen, K., Regi J. Thomas and George V. Thomas. 2014. Coconut Varieties and Hybrids. CPCRI Technical Bulletin No. 87. Central Plontation Crops Research Institute, Kasaragod, Kerola, India, 40 p.



# **ARECANUT**

# Taxonomic information

Kingdom: Plantae

Subkingdom: Tracheobionta

Super division: Spermatophyta

Division: Magnoliophyta

Class: Liliopsida

Sub class: Arecidae

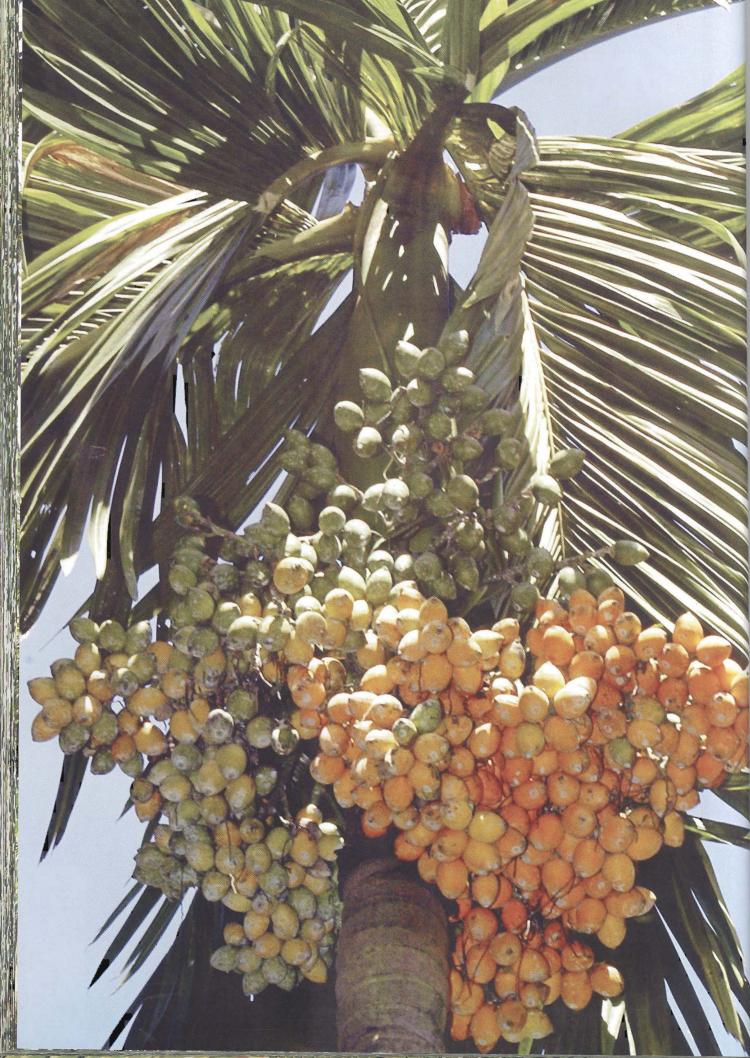
Order: Arecales

Family: Arecaceae

Genus: Areca L.

Species: Areca catechu L.

Common name: Betel palm, Arecanut palm





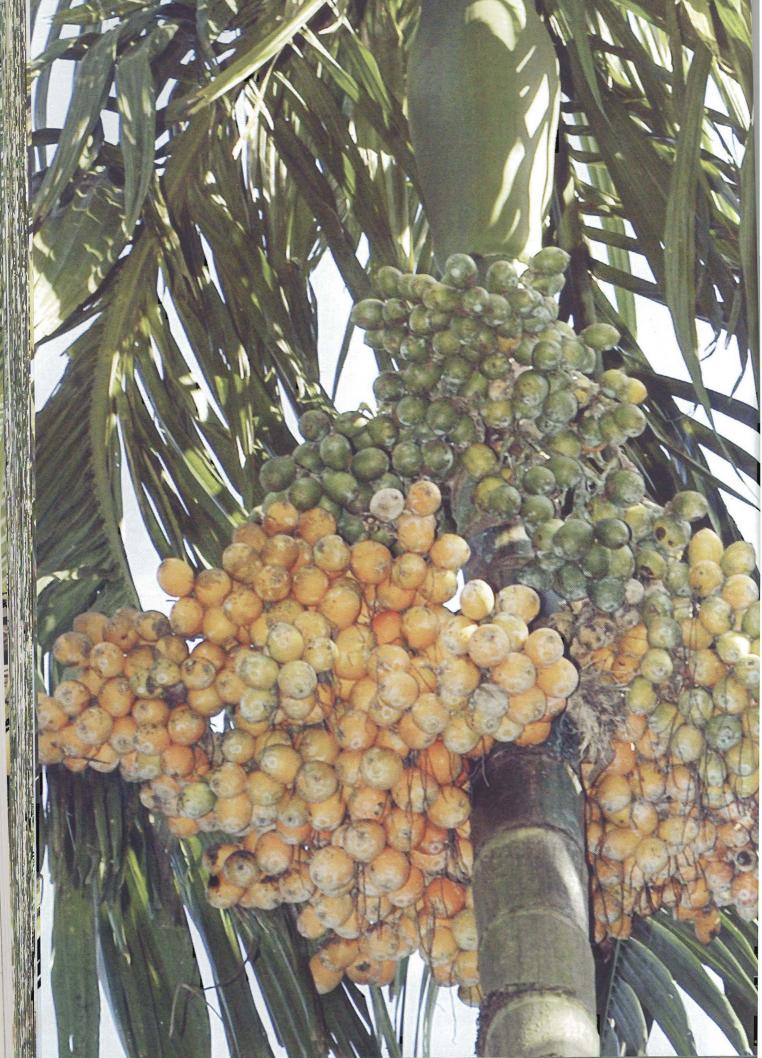
National Identity	IC 557417
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regional Station, Vittal, D.K. Karnataka
Collaborating centre(s), if any	
Breeding method & Parentage	Introduction, selection and evaluation from the occession VTL-3, an exotic accession introduced as germplasm from China in the year 1957.
Recommended	
Purpase	High dry kernel yield, Semi tall habit and Earliness in flowering
State/ecological region	Areca growing areas of coastal Karnotaka and Kerala.
Yield performance in evaluat	ion trial
Mean	2.90 kg dry kernel/palm/year 3700 – 3900 kg dry kernel/ha/year
Potential	4.50 kg dry kernel/palm/year 6000-6300 kg dry kernel/ha/year
Description of variety	
Morphalogicol features	Habit: Semi tall in nature, partially drooping crown, shorter internodal length, medium thick stem, more number of bunches and high yielding. Fruits: Compact arrangement of oval to round nuts in the rachillae, more number of bunches and early stabilization in the yield Seedlings: Vigourous, dark green petiole; 12 month seedling - 6 leaves, collar girth of 6.68 cm and height 82 cm
Flowering attributes	Flower initiation: 36-40 months after planting.
Quality attributes	Meets the standard quality of chall/dried kernel and raw nut for chewing.
Reaction to major diseases/ pests	No major disease/pest attacks observed under field conditions. Prophylactic measures ore to be adopted for fruit rot disease, in endemic tracts.
Reaction to environment stresses	Recommended for cultivation under irrigated condition.
Specific recommendations, for seed production	Inter se mating and selection of seedlings is suggested to produce genetically superior pure planting materials.
Other pertinent information/re	eferences
	stitute Research Council Meeting - 1972. 971-72, Central Plantation Crops Research Institute, Kasaragod, Kerala, India





National Identity	IC 557418
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regional Station, Vittal, D.K. Karnataka
Collaborating centre(s), if any	ICAR-CPCRI Research Centre, Kidu.
Breeding method & Parentage	Introduction, selection and evaluation from the accession VTL 11 introduced as germplasm from Indonesia in the year 1957.
Recommended	
Purpose	High dry kernel yield ond high recovery of chali.
State/ecological region	Areca growing areas of Karnatako and Kerala.
Yield performance in evaluati	on trial
Mean	3.28 kg dry kernel/palm/year 3900 - 4350 kg dry kernel/ha/year
Potential	5.60 kg dry kernel/palm/year 7400-7700 kg dry kernel/ha/year
Description of variety	
Morphological features	Habit: Tall palms, long internodal length, medium thick stem, more number of bunches and high yielding. Fruits: Compact arrangement of oval nuts in the rachillae, and yellow to orange coloured nuts, more number of bunches and early to medium stabilization in the yield Seedlings: Vigourous, green petiole; 12 month seedling - 6 leaves, collar girth of 5.76 cm and height 118 cm
Flowering attributes	Flower initiation: 42-46 months after planting, under irrigated conditions
Quality attributes	Meets the standard quality of chali/dried kernel and raw nut for chewing.
Reaction to major diseases/ pests	No major disease/pest attacks observed under field conditions. Prophylactic measures are to be adopted for fruit rot disease, in endemic tracts.
Reaction to environment stresses	Relatively tolerant to water limited conditions.
Specific recommendations, for seed production	Inter se mating ond selection of seedlings suggested for quality planting material production.

Recommended for Release: Institute Research Council Meeting - 1985. CPCRI, 1985, Annual Report 1984-85, Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 213 p.

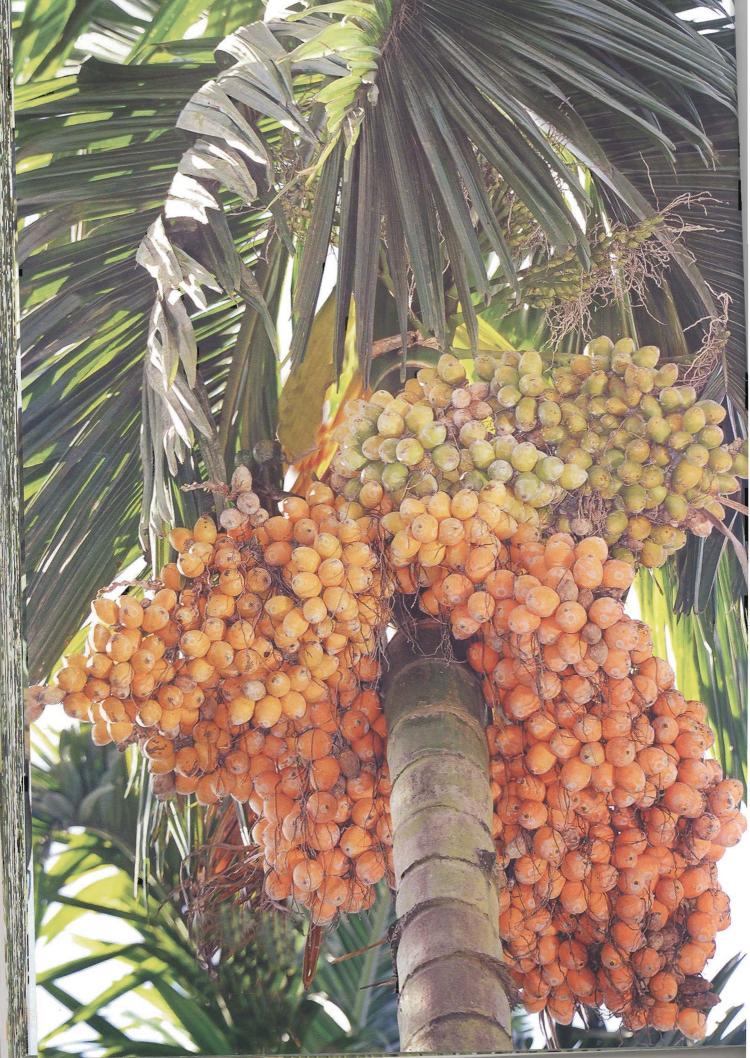




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National Identity	IC 557420
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regional Station, Vittal, D.K. Karnatako
Collaborating centre(s), if any	ICAR-CPCRI Research Centre, Kidu
Breeding method & Parentage	Introduction, selection and evaluation from the accession VTL-17, an arecanut germplasm introduced fram Singapore in the year 1957.
Recommended	
Purpose	High dry kernel yield and bold nuts
State/ecological region	Areca growing areas of Karnataka and Kerala.
Yield performance in evaluat	ion trial
Mean	3.18 kg dry kernel/palm/year 4240-4500 kg dry kernel/ha/year
Potential	5.40 kg dry kernel/palm/year 7100 - 7300 kg dry kernel/ha/year
Description of variety	
Morphological features	Habit: Tall palms, partially drooping crown, long internodal length, sturdy stem, more number of bunches and high yielding. Fruits: Round and bold nuts in the rachillae, more number of bunches and medium stabilization in the yield Seedlings: Vigourous, green petiole; 12 month seedling - 6 leaves, collar girth of 5.76 cm and height 115 cm
Flowering attributes	Flower initiation: 44 to 48 months after planting.
Quality attributes	Meets the standard quality of chali/dried kernel and raw nut for chewing.
Reaction to major diseases/ pests	No major disease/pest attacks observed under field conditions. Prophylactic measures are to be adopted for fruit rot disease, in endemic tracts.
Reaction to environment stresses	Relatively tolerant to water limited conditions.
Specific recommendations, for seed production	Inter se mating and selection of seedlings suggested for production of superior planting materials.
Other pertinent information/re	oforonoo:

Recommended for release: Institute Research Council Meeting - 1985. CPCRI. 1985. Annual Report 1984-85. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 213 p.







National Identity	IC 557422
Institution responsible for developing variety	ICAR-Central Plontation Crops Research Institute, Regional Station, Vittal, D.K. Karnataka
Collabarating centre(s), if any	ICAR-CPCRI Research Centre, Kidu ICAR-CPCRI Research Centre, Mohitnagar
Breeding method & Parentage	Selection and evaluation from indigenous accession VTL-60
Recommended	
Purpose	High dry kernel yield
State/ecological region	Areca growing areas of Karnataka, Kerala and North Bengal (West Bengal).
Yield performance in evaluat	ion trial
Mean	3.67 kg dry kernel/palm/year 5030 kg dry kernel/ha/year
Potential	5.50 kg dry kernel/palm/year 7540 kg dry kernel/ha/year
Description of variety	
Morphalogical features	Habit: Tall in nature, partially drooping crown, long internodal length, medium thick stem, more number of bunches, high yielding and homogenous population. Fruits: Loosely arranged oval to round nuts in the rachillae, more number or bunches and early stabilization in the yield Seedlings: Vigourous, light green petiole; 12 month seedling - 6 leaves collar girth of 4.56 cm and height 122 cm
Flowering attributes	Flower initiation: 48 months after planting.
Quality attributes	Meets the standard quality of chali/dried kernel and raw nut for chewing.
Reaction to major diseases/ pests	No major disease/pest attacks observed under field conditions. Prophylactic measures ore to be adopted for fruit rot disease, in endemic tracts.
Reaction to environment stresses	Relatively tolerant to woter limited conditions.
Specific recommendations, for seed production	Inter se mating and selection of seedlings suggested to produce genetically superior and uniform planting material.
Other pertinent information/re	eferences

Recommended for release: X AICRPP Group Meeting - 1991 Recommended for release as National variety

CPCRI. 1991. Annual Report 1990-91. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 142 p.





National Identity	IC 557419
Institution responsible for developing variety	ICAR-Central Plontation Crops Research Institute, Regional Station, Vittal, D.K. Karnataka
Collaborating centre(s), if any	ICAR-CPCRI Research Centre, Kidu ICAR-CPCRI Research Centre, Mohitnagar
Breeding method & Parentage	Introduction, evaluation and selection from the accession VTL 12 introduced from Vietnam in the year 1961.
Recommended	
Purpose	Dry kernel, high recovery of kernel.
State/ecological region	Areca growing areas of Karnataka and Kerala.
Yield performance in evaluat	ion trial
Mean	3.88 kg dry kernel/palm/year 5320 kg dry kernel/ha/year
Potential	5.50 kg dry kernel/palm/year 7700 kg dry kernel/ha/year
Description of variety	
Morphological features	Habit: Toll in nature, with medium thick stem, shorter internodes, partially drooping crown, homogeneous population, consistent in yield, bunched are well ploced on the stem.  Fruits: Oronge to deep yellow colour nuts, bold with oblong to round shaped nuts, high recovery (26.52%) of chali from fresh nuts.  Seedlings: Vigourous, green petiole; 12 month seedling - 6 leaves, collar girth of 5.66 cm and height 115 cm.
Flowering attributes	Flower initiation: 46 months after planting.
Quality attributes	Meets the standard quality of chali/dried kernel and raw nut for chewing.
Reaction to major diseases/ pests	No major disease/pest attacks observed under field conditions. Prophylactic measures are to be adopted for fruit rot disease, in endemic tracts.
Reaction to environment stresses	Recommended for cultivation only under irrigated conditions.
Specific recommendations, for seed production	Inter se mating and selection of seedlings suggested to produce genetically superior planting material.
Other pertinent information/re	eferences .
	stitute Research Council Meeting - 2005 )05-06. Central Plantation Crops Research Institute, Kasaragod, Kerala, India

128 p.





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Central Plantation Crops Research Institute, Regional Station, Vittal, D.K. staka  CPCRI Research Centre, Kahikuchi and ICAR-CPCRI Research Centre, inagar ation and selection from the indigenous accession VTL 64  ernel, m and Meghalaya  to a dry kernel/palm/year kg dry kernel/palm/year
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: Tall palms, medium thick stem, longer internodes, partially drooping n, uniform population and consistent in yield. Econamic yield can be ed up to 45 years depending upon the management. Orange colour, bold and round shape nuts lings: Vigourous, light green petiole; 12 month seedling - 6 leaves r girth of 5.80 cm and height 112 cm.
er initiation: 50-52 months after planting.
s the standard quality of chali/dried kernel and raw nut for chewing.
ajor disease/pest attacks observed under field canditions. Prophylactic sures are to be adopted for fruit rot disease, in endemic tracts.
mmended for cultivation only under irrigated conditions.
se mating and selection of seedlings is suggested to produce tically superior quality planting materials.
1

Recommended for release: Institute Research Council Meeting - 2008 CPCRI. 2009. Annual Report 2008-09. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 145 p.





IC 593737
ICAR-Central Plantation Crops Research Institute, Regional Station, Vittal, D.K. Karnataka
BSKKV, Dopoli, Maharoshtra and ICAR-CPCRI Research Centre, Mohitnagar, West Bengal
Evaluation and selection from VTL 62, an arecanut population of Maharashtro
Dry kernel, tender nut processing.
Areca growing areas of Karnatako and Maharashtra
tion trial
3.54 kg dry kernel/palm/yeor 4500-5000 kg dry kernel/ha/year 2.95 kg dry tender processed nuts/polm/year 3800-4500 kg dry tender processed nuts/ha/year
5.12 kg dry kernel/palm/year 6500-7000 kg dry kernel/ha/yeor 3.50 kg dry tender processed nuts/palm/yeor 4600-4800 kg dry tender processed nuts/ha/year
Habit: Semi tall polms, medium thick stem, shorter internodes, partiolly drooping crown, homogeneous population, regular bearer, consistent in yield. Economic yield can be realized up to 35 years, depending upon the management.  Fruits: Orange to yellow colour, oval and round shape, medium size nuts high chali recovery (26 %) from fresh nuts.  Seedlings: Vigourous, light green petiole; 12 month seedling - 6 leaves collar girth of 4.95 cm and height 86 cm.
Flower initiation: 42 months after planting.
Less arecoline and more polysaccharide content
No major disease/pest attacks observed under field conditions. Prophylactic measures are to be adopted for fruit rot disease, in endemic tracts.
Recommended for cultivation only under irrigated conditions.
Inter se mating and selection of seedlings is suggested to produce

Recommended for release: Institute Research Council Meeting - 2010 and XX AICRPP Group Meeting - 2011.

Notification: Ministry of Agriculture Notification. S.O. 1714(E). The Gazette of India: Extraordinary Part II-Section 3-Sub section (ii) No. 999 Dated 18 July 2014.

CPCRI. 2012. Ànnual Report 2011-12. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 128 p.



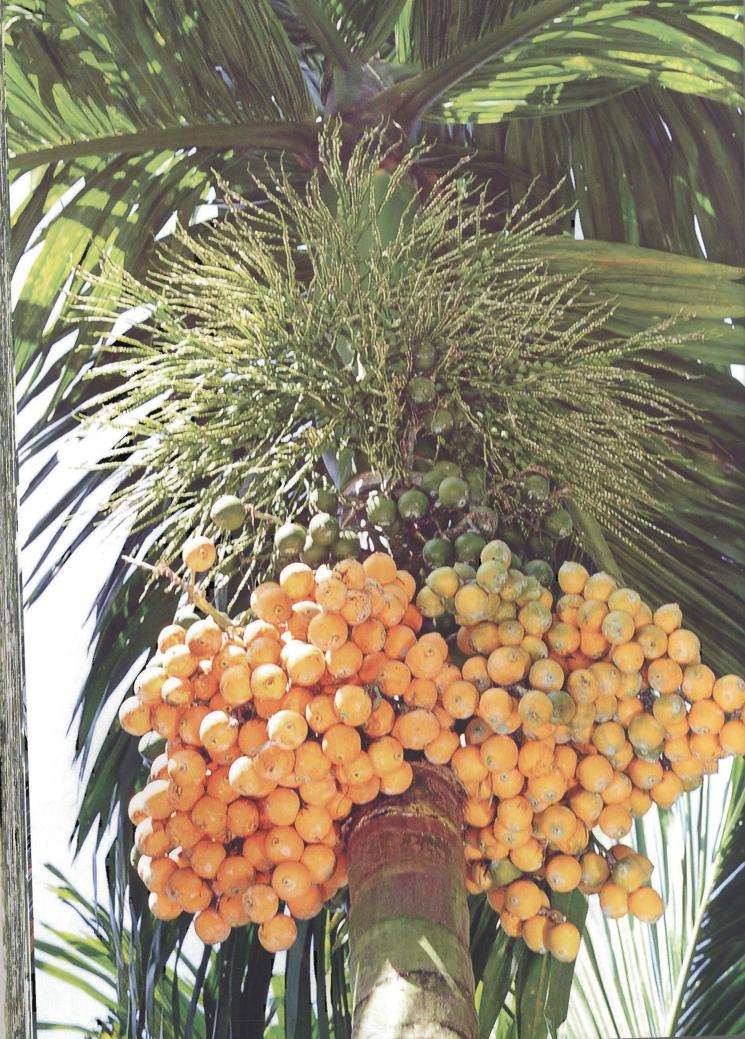




National Identity	IC 593736
Institution responsible for developing variety	ICAR-Centrol Plantation Crops Research Institute, Regional Station, Vittal D.K. Karnataka
Collaborating centre(s), if any	ICAR-CPCRI Research Centre, Mohitnagar, West Bengal
Breeding method & Parentage	Evaluation and selection from indigenous accession VTL 75
Recommended	
Purpose	Dry kernel.
State/ecological region	Areca growing areas of Karnataka
Yield performance in evaluat	ion trial
Mean	4.15 kg dry kernel/palm/year 5600 kg dry kernel/ha/yeor
Potential	6.20 kg dry kernel//palm/year 7500-7800 kg dry kernel/ha/year
Description of variety	
Morphological features	Habit: Tall palms, medium thick stem, longer internodes, partially drooping crown, homogeneous population, consistent in yield. Economic yield car be realized up to 40 years depending upon the management. Fruits: Yellow colour, round shape nuts, high recovery (25.18%) of chali from fresh nuts.  Seedlings: Vigourous, dark green petiole; 12 month seedling - 6 leaves collar girth of 6.20 cm and height 104 cm.
Flowering attributes	Flower initiation: 48 months after planting.
Quality attributes	Meets the standard quality of dried kernel and raw nut for chewing.
Reaction to major diseases/ pests	No major disease/pest attacks observed under field conditions. Prophylactic measures are to be adopted for fruit rot disease, in endemic tracts.
Reaction to environment stresses	Recommended for cultivation under irrigated conditions.
Specific recommendations , for seed production	Inter se mating and selection of seedlings suggested to produce genetically superior pure planting materials.
Other pertinent information/re	eferences

Recommended for release: Institute Research Committee - 2010 and XX AICRPP Group Meeting - 2011. Notified: Ministry of Agriculture Notification. S.O. 1714(E). The Gazette of India: Extraordinary Part II-Section 3-Sub section (Ii) No. 999 Dated 18 July 2014.

CPCRI. 2012. Annual Report 2011-12. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 128 p.



### SHATA MANGALA

National Identity	IC 557397
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regional Station, Vittal, D.K. Karnotaka
Collaborating centre(s), if any	ICAR-CPCRI Research Centre, Mohitnagar, West Bengal
Breeding method & Parentage	Evaluation and selection from indigenous accession VTL 146
Recommended	
Purpose	Dry kernel, tender nut processing.
State/ecological region	Areca growing areas of Karnataka and Gujarat
Yield performance in evalua	tion trial
Mean	3.96 kg dry kernel/palm/year 5000 kg dry kernel/ha/year 3.26 kg dry tender processed kernel/palm/year 4500 kg dry tender processed kernel/ha/year
Potential	4.45 kg dry kernel/palm/year 5600 kg dry kernel/ha/year 3.6 kg dry tender processed kernel/palm/year 4800 kg dry tender processed kernel/ha/year
Description of variety	
Morpholagical features	Habit: Semi-tall palms, medium thick stem, shorter internodes, partially drooping crown, homageneous population, consistent in yield, synchronized maturity of nuts.  Economic yield can be realized up to 45 years depending upon the management.  Fruits: Orange colour, round shape, medium size nuts, high recovery (26.8%) of chali from fresh nuts.  Seedlings: Vigourous, dark green petiole; 12 month seedling - 6 leaves, collar girth of 5.20 cm and height 80 cm
Flowering attributes	Flower initiation: 40 months after planting.
Quality attributes	Meets the standard quality of dried kernel and and also for tendernut processing.
Reactian ta majar diseases/ pests	Na major disease/pest attacks abserved under field canditions. Minar pests like spindle bug and mite attacks abserved occasianally which could be cantrolled effectively. Prophylactic measures are to be adapted for fruit rot disease, in endemic tracts.
Reaction ta environmental stresses	Recommended for cultivation under rainfed and Irrigated canditions,
Specific recommendations, for seed production	Inter se mating and selection of seedlings suggested to produce genetically superior pure planting materials.
Other pertinent information/r	eferences

Recommended far release: ICAR-CPCRI Centenary year, XXV AICRPP Graup Meeting – 2016 ICAR-CPCRI, 2016, KALPA CPCRI Newsletter 35 (2) April- June 2016, Central Plantatian Crops Research Institute, Kasaragod, Kerala, India, pp. 2.





124 p.

National Identity	IC 557423
Institution responsible for developing variety	ICAR-Central Plontation Crops Research Institute, Regional Station, Vittal, D.K. Karnataka
Collaborating centre(s), if any	ICAR-CPCRI Research Centre (presently IIHR-CHES), Hirehalli
Breeding method and Parentage	Hybridization involving Hirehalli Dwarf (VTL 56) as female parent and Sumangala (IC 557418) as mole parent
Recommended	
Purpose	Dwarfness and medium dry kernel yield, compact canopy
State/ecological region	Areca growing areas of Karnataka
Yield performance in evaluation	tion trial
Mean	2.54 kg dry kernel/palm/year 3100-3400 kg dry kernel/ha/year.
Potential	3.20 kg dry kernel/palm/year 4200-4400 kg dry kernel/ha/year
Description of variety	
Morphological features	Habit: Dwarf stature and sturdy stem palms, super imposed nodes, partia drooping crown with well spread leaves and reduced canopy size. Economic yield can be realized up to 30 years depending upon the management. Fruits: Yellow colour, medium size, round to oval nuts, early stabilization in yield, higher percentage of recovery of chali from the fresh fruit, high recovery of chali from fresh nuts  Seedlings: Vigourous, dark green petiole; 12 month seedling - 6 leaves, collar girth of 7.10 cm and height 56 cm.
Flowering attributes	Flower initiation: 45 months after planting.
Quality attributes	Meets the standard quality of chali/dried kernel and raw nut for chewing.
Reaction to major diseases/ pests	No major disease/pest attacks observed under field conditions. Prophylactic measures are to be adopted for fruit rot disease, in endemic tracts.
Reaction to environment stresses	Recommended for cultivation under irrigated conditions.
Specific recommendations , for seed production	Crossing is suggested between Hirehalli dwarf and Sumangala in order to produce hybrids. Selection of typical hybrid seedlings in the nursery is a must For the purpose of large scale hybrid seed production, parental blocks of Hirehalli Dwarf and Sumangala are to be established.
Other pertinent information/r	eferences
Group Meeting held at ZARS (L	nstitute Research Council Meeting - 2004 and Zonal research and extension JAS), Brahmavar - 2007. 006-07. Central Plantation Crops Research Institute, Kasaragod, Kerala, India



### VTLAH2

National Identity	IC 557424
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regional Station, Vittal, D.K. Karnataka
Collaborating centre(s), if any	ICAR-CPCRI Research Centre (presently IIHR-CHES), Hirehalli
Breeding method & Parentage	Hybridization involving Hirehalli Dwarf (VTL 56) as female parent and Mohitnagar (IC 557422), as male parent
Recommended	
Purpose	Dwarfness and medium dry kernel yield, compact canopy
State/ecological region	Areco growing areas of Karnataka
Yield performance in evaluat	ion trial
Meon	2.64 kg chali/palm/year 3500-3800 kg dry kernel/ha/year
Potential	3.40 kg chali/palm/year 4300-4600 kg dry kernel/ha/year
Description of variety	
Morphological features	Habit: Dwarf stature and medium thick stem, super imposed nodes, drooping crown with well spread leaves and reduced canopy size. Economic yield can be realized up to 30 years depending upon the management. Fruits: Deep yellow colour, medium size, oval nuts, early stabilization in yield, higher percentage of recovery of chali (dry kernel) from the fresh fruit Seedlings: Vigourous, dark green petiole; 12 month seedling - 6 leaves, collar girth of 6.70 cm and height 60 cm.
Flowering attributes	Flower initiation: 43 months after plonting.
Quality attributes	Meets the standard quality of chali/dried kernel and raw nut for chewing.
Reaction to major diseases/ pests	No major disease/pest attacks observed under field conditions. Prophylactic measures are to be adopted for fruit rot disease, in endemic tracts.
Reaction to environment stresses	Recommended for cultivation only under irrigated conditions.
Specific recommendations, for seed production	Crossing is suggested between Hirehalli dwarf and Mohitnagar parental palms for production of hybrids. Selection of typical hybrid seedlings in the nursery is a must.  For the purpose of large scale hybrid seed production, parental blocks of Hirehalli Dwarf and Mohitnagar have to be established.
Other pertinent information/re	eferences
Recommended for release: In	etitute Research Council Meeting - 2004, and Zonal research and extension

Recommended for release: Institute Research Council Meeting - 2004, and Zonal research and extension Group Meeting held at ZARS (UAS), Brahmavar - 2007.

CPCRI, 2007. Annual Report 2006-07. Central Plantation Crops Research Institute, Kasaragod, Kerala, India,

124 p.



# COCOA

# **Taxonomic information**

Kingdom: Plantae

Sub kingdom: Tracheobionta

Super division: Spermatophyta

Division: Magnoliophyta

Class: Magnoliopsida

Sub class: Dilleniidae

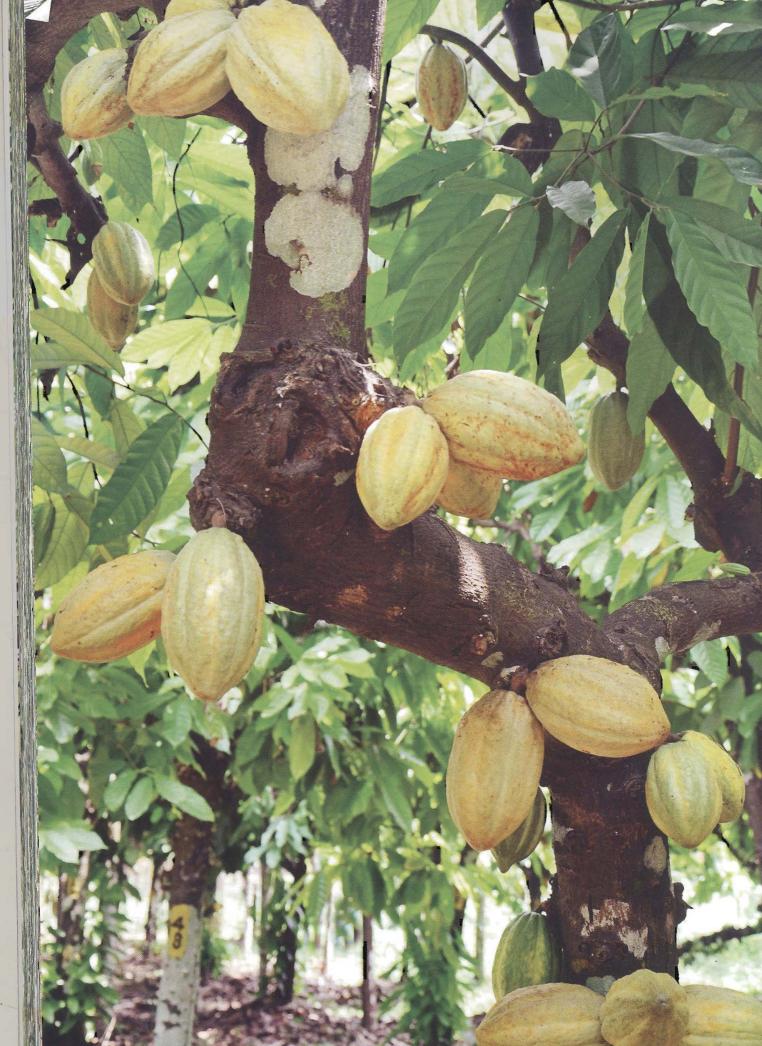
Order: Malvales

Family: Sterculiaceae/ Malvaceae

Genus: Theobroma L.

Species: Theobroma cacao L.

Common name: Cocoa, cocoa tree, chocolate tree, cacao tree





National Identity	IC 593742
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regional Station, Vittal, Karnataka- 574 243.
Breeding method & Parentage	Introduction - Evaluation - Selection - Evaluation - Selection Selection from Nigerian clone NC 45, CPCRI cocoa accession (EC 631558) acquired in the year 1974.
Purpose	Early and heavy bearer, self-compatible clone, suitability for high density planting
State/ecological region	Arecanut/Coconut growing tracts of Western Ghats hills and plains, Narth Eastern zones
Yield performance in evalua	tion trial
Mean	Dry bean yield: 1.30 kg/tree/year Yield/ha: 890 kg (685 trees under arecanut)
Potential	Dry bean yield: 2.50 kg/tree/year
Description of variety	
Plant habit	Intermediate with small canopy 12-15 m <sup>2</sup>
Flowering	Commences 4 years after planting in seedling progenies and 2 years in grafted/clonal progenies
Pod and Bean features	Green color, smooth, obovate/amelonado type pod with thin husk 50-75 pods/tree/year in 12 year old tree Pod index: 35 pods required to produce 1 kg dry bean No. of beans: 32-35/pod Beon index: 0.9 to 1.05 g/bean Rich in fat ond fatty acids
Reaction to major pests and diseases	Low incidence of <i>Phytophthora</i> pod rot and tea mosquito bug.
Reaction to environmental stress	Supplementary irrigation @ 20 litres/day as drip during rainless period is recommended.
Planting material production	Seed and clonal multiplication

Recommended for release: ICAR-CPCRI, Regional Station, Vittal - Golden Jubilee Year 2006
Elain Apshara, S., Bhat, V.R., Ananda, K.S. and Nair, R.V. 2007. High yielding cocoa varieties of the Central Plantation Crops Research Institute, India. *INGENIC Newsletter*, 11: 12-15.

Elain Apshara, S. 2014. Performance of elite cocoa clones under coconut in double hedge system of planting. The Cashew and Cocoa Journal, 3(2): 13-16.



### VTLCS-1 (Vittal Cocoa Selection-1)

National Identity	IC 597837
Institution responsible for developing variety	ICAR-Centrol Plantation Crops Research Institute, Regional Station, Vittal, Karnataka - 574 243.
Breeding method & Parentage	Introduction - Evaluation (as seedlings) - Selection - Evaluation (as clones) - Selection Selection from Malaysian clone, Jerangau Red Axil (JRA) CPCRI cocoa accession VTLC 1 (EC 631530) acquired in the year 1968.
Recommended	
Purpose	High dry bean yield, suitability for both arecanut and coconut shades
State/ecological region	Arecanut/coconut growing tracts of Western Ghats hills and plains
Yield performance in evaluat	ion trial
Mean	Dry beon yield: 2.2 to 2.5 kg/tree/year Yield/ha: 1100-1700 kg (685 trees under arecanut, 500 trees under coconut)
Potential	Dry bean yield: 4.5 kg/tree/year
Description of variety	
Plant habit	Intermediate with medium canopy 16-20 m²
Flowering	Commences 4 years after planting in seedling progenies and 2 years in grafted/clonal progenies.
Pod and Bean features	Red colour, smooth, obovate pods with thick husk. 51-57 pods/tree/year in 12 year old tree Pod index: 21-22 pods required to produce 1 kg dry bean No. of beans: 40-42/pod Bean index: 1.10 to 1.15 g/bean Rich in fat and fatty acids
Reaction to major pests and diseases	Low incidence of <i>Phytophthora</i> pod rot and tea mosquito bug.
Reaction to environmental stress	Adapted to water limited conditions
Planting material production	Seed and clonal multiplication
Other partinent information/	form

#### Other pertinent information/references

Recommended for release: XXI AICRPP Group Meeting - 2012.

CPCRI. 2012. Annual Report, 2011-2012. Central Plantation Crops Research Institute, Kasaragod, Kerala, India, 128 p.

Elain Apshara, S. 2013. Performance of selected cocoa clones under arecanut and coconut. *Jaurnal of Plantation Crops*, 41 (2): 242-246.





National Identity	IC 597838
Institution responsible for developing variety	ICAR-Central Plontation Crops Research Institute Regional Station, Vittal, Karnataka - 574 243.
Breeding method & Parentage	Introduction - Evaluation (as seedlings) - Selection - Evaluation (as clanes) Selection from Upper Amozon Forastero, Imperial Mixed Calabacillo (IMC) CPCRI cocoa accession VTLC 57 (EC 631582) acquired in the year 1981
Recommended	
Purpose	High dry bean yield, high industrial value with bold and big beans, suitability for both arecanut and coconut shades
State/ecological region	Arecanut/coconut growing tracts of Western Ghats hills and plains
Yield performance in evalua	tion trial
Mean	Dry bean yield: 2.5-2.7 kg/tree/year Yield/no: 1250 - 1800 kg (685 trees under arecanut, 500 trees under coconut plantations)
Potential	Dry bean yield: 4.7 kg/tree/year
Description of variety	
Plant habit	Intermediate with medium canopy 15 m²
Flowering	Commences 4 years after planting in seedling progenies and 2 years in grofted/clonal progenies.
Pod and Bean features	Green colour, smooth, obovate to elliptic pods with thick husk. 53-56 pods/tree/year in 12 year old tree Pod index: 19-21 pods required to produce 1 kg dry bean No. of beans: 40-42/pod Bean index: 1.21 to 2.00 g/bean Rich in fat and fatty acids
Reaction to major pests and diseases	Low incidence of <i>Phytophthora</i> pod rot and tea mosquito bug damage.
Reaction to environmental stress	Adapted to water limited conditions
Planting material production	Seed and clonal multiplication
A	

Recommended for release: XXI AICRPP Group Meeting - 2012

CPCRI. 2012. Annual Report, 2011-2012. Centrol Plantation Crops Research Institute, Kasaragod, Kerala, India, 128 p.

Elain Apshara, S. 2013. Performance of selected cocoa clones under arecanut and coconut. *Journal of Plantation Crops, 41* (2): 242-246.





National Identity	IC 593738
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regional Statian, Viftal, Karnataka - 574 243.
Breeding method & Parentage	Hybridizatian - Evaluatian - Selection Hybrid between Malaysian collections EC 631540 x EC 631534 The parentol accessions, VTLC 11 and VTLC 5 in the CPCRI germplasm collection was acquired in the year 1968
Recommended	
Purpase	Vigarous, early and heavy bearer
State/ecalagical region	Arecanut growing tracts of Western Ghats hills and plains
Yield performance in evalua	tion trial
Mean	Dry bean yield: 1.4 kg/tree/year Yield/ha: 959 kg (685 trees under arecanut)
Potential	Dry bean yield: 3 kg/tree/year
Description of variety	
Plant habit	Erect with medium canopy 17 m²
Flowering	Commences 4 years after planting in seedling pragenies and 2 years in grafted/clonal progenies
Pod and Bean features	Green colour, obovate pods with thick husk. 40-50 pods/tree/year in 12 year old tree Pad index: 30 pods required to produce 1 kg dry bean Na. of beans: 35-40/pod Bean index: 1.00 to 1.10 g/bean Rich in fat ond fatty acids
Reaction to major pests and diseases	Low incidence of <i>Phytophthara</i> pod rat and tea masquito bug damage.
Reaction to environmental stress	Supplementary Irrigation @ 20 litres/day as drip during rainless period is recommended
Planting material production	(i) Parents to be multiplied as clones and assembled into bi-clonal garden tor hybrid seed production. (ii) Clonal multiplication of hybrids.
Other pertinent information/r	eferences

Recammended for release: ICAR-CPCRI, Regional Station, VIttal - Golden Jubilee Year 2006. Elain Apshara, S., Bhat, V. R., Ananda, K. S. and Nair, R. V. 2007. High yielding cocaa varieties of the Central Plantation Craps Research Institute, India. INGENIC Newsietter, 11: 12-15.





## VTLCH-2 (Vittal Cocoa Hybrid-2)

National Identity	IC 593739
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regional Station, Vittal, Karnataka - 574 243.
Breeding method & Parentage	Hybridization - Evaluation - Selection Hybrid between Lolbaugh collections IC 565551 x IC 565556 The parental accessions, VTLC 61 and VTLC 66 in the CPCRI germplasm collection was acquired in the year 1982.
Recommended	
Purpose	Vigorous, early and heavy bearer, tolerant to black pod rot, performs well both as seedlings and clones
State/ecological region	Areconut growing tracts of Western Ghats hills and plains
Yield performance in evalua	tion trial
Mean	Dry bean yield: 1.5-2.0 kg/tree/year Yield/ha: 1030-1350 kg/ha (685 trees under arecanut)
Potential	Dry bean yield: 3.5 kg/tree/yeor
Description of variety	
Plant habit	Erect with medium canopy 15-20 m <sup>2</sup>
Flowering	Commences 4 years after planting in seedling progenies and 2 years in grafted/clonal progenies
Pod and Bean features	Green colour, obovate pods with thick husk. 50-65 pods/tree/year in 12 year old tree Pod index: 25 pods required to produce 1 kg dry bean No. of beans: 40-45/pod Bean index: 1.00 to 1.15 g/bean Rich in fat and fatty acids
Reaction to major pests and diseases	Low incidence of <i>Phytophthora</i> pod rot and tea mosquito bug damage.
Reaction to environmental stress	Supplementary irrigation @ 20 litres/day as drip during rainless period is recommended
Planting material production	<ul><li>(i) Parents to be multiplied as clones and assembled into bi-clonal garden for hybrid seed production.</li><li>(ii) Clonal multiplication of hybrids.</li></ul>
Other marking and information to	

#### Other pertinent information/references

Recommended for release: ICAR-CPCRI, Regional Station, Vittal - Golden Jubilee Year 2006.

Elain Apshara, S., Bhat, V. R., Ananda, K. S. and Nair, R. V. 2007. High yielding cocoa varieties of the Central Plantation Crops Research Institute, India. *INGENIC Newsletter*, 11: 12-15.

Elain Apshora, S., Bhat, V.R. and Nair, R.V. 2008. Comparative studies on elite cocoo progenies in their initial years of growth. *Journal of Plantation Crops*, 36 (1): 38 - 44.



## VTLCH-3 (Vittal Cocoa Hybrid-3)

National Identity	IC 593740
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regianal Station, Vittal, Karnataka - 574 243.
Breeding method & Parentage	Hybridization - Evaluation - Selection Hybrid between Malaysian x Nigerian collections EC 631534 x EC 631546 The parental accessions, VTLC 5 and VTLC 19 in the CPCRI germplasm collection was acquired in the year 1968 and 1974, respectively.
Recommended	
Purpase	High yielder and tolerant to water deficit stress
State/ecological region	Arecanut growing tracts of Western Ghats hills and plains/coconut growing tracts of Andhra Prodesh and Tamil Nadu
Yield performance in evaluat	ion trial
Mean	Dry bean yield: 1.7 kg/tree/year Yield/ha: 1150 kg (685 trees under arecanut)
Potential	Dry bean yield: 2 kg/tree/year
Description of variety	
Plant habit	Erect with medium canopy 18 m <sup>2</sup>
Flowering	Commences 4 years after planting in seedling progenies and 2 years in grafted/clonal progenies
Pad and Bean features	Green colour, obovate pods with thick husk. 41 pods/tree/year in 12 year old tree Pod index: 30 pods required to produce 1 kg dry bean No. af beans: 41/pod Bean index: 1.00 to 1.05 g/bean
Reaction to major pests and diseases	Low incidence of <i>Phytophthora</i> pod rot and tea masquito bug damage. Praphylactic sprays required
Reaction to environmental stress	Parents and progenies tolerant to water deficit stress
Planting material production	<ul><li>(i) Parents to be multiplied as clones and ossembled into bi-clonal garder for hybrid seed production.</li><li>(ii) Clonal multiplication of hybrids.</li></ul>

#### Other pertinent information/references

Recommended for release: ICAR-CPCRI, Regional Station, Vittal - Golden Jubilee Year 2006. Balasimha, D., Anil Kumar, V., Viraktamath, B.C. and Ananda, K. S. 1999. Leaf water potential and stomatal resistance in cocoa hybrids and parents. *Plantations Recherche Developpement, 6*: 116-120. Elain Apshara, S. 2014. Clonal evaluation of cocoa hybrids and their parents. *The Cashew and Cocoa Journal, 3*(3): 17-21.





National Identity	IC 593741
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regional Station, Vittal, Karnataka - 574 243.
Breeding method & Parentage	Hybridization - Evaluation - Selection Hybrid between Molaysian x Nigerian collections EC 631534 x EC 631556 The parental accessions, VTLC 5 and VTLC 30 in the CPCRI germplasm collection was acquired in the year 1968 and 1974, respectively.
Recommended	
Purpose	High yielder and tolerant to water deficit stress
State/ecological region	Arecanut growing tracts of Western Ghats hills and plains/coconut growing tracts of Andhra Pradesh and Tomil Nadu
Yield performance in evalua	tion trial
Mean	Dry bean yield: 1.6 kg/tree/year Yield/ha: 1090 kg (685 trees under orecanut)
Potential	Dry bean yield: 2 kg/tree/year
Description of variety	
Plant habit	Erect with medium canopy 18 m <sup>2</sup>
Flowering	Commences 4 years after planting in seedling progenies and 2 years in grafted/clonal progenies
Pod and Bean feotures	Red colour, obovate pods with thick husk. 40 pods/tree/yeor in 12 year old tree Pod index: 30 pods required to produce 1 kg dry bean No. of beans: 40/pod Bean index: 1.00 to 1.07 g/bean
Reaction to major pests and diseoses	Low incidence of <i>Phytophthora</i> pod rot and tea mosquito bug damage. Prophylactic sprays required
Reaction to environmental stress	Parents and progenies tolerant to water deficit stress
Planting material production	<ul><li>(i) Parents to be multiplied as clones and assembled into bi-clonal garden for hybrid seed production.</li><li>(ii) Clonal multiplication of hybrids.</li></ul>

Recommended for release: ICAR-CPCRI, Regional Station, Vittal - Golden Jubilee Year 2006.
Balasimha, D., Anil Kumar, V., Viraktamath, B.C. and Ananda, K. S. 1999. Leaf water potential and stomatal resistance in cocoa hybrids and parents. *Plantations Recherche Developpement, 6*: 116-120.
Elain Apshara, S. 2014. Clonal evaluation of cocoa hybrids and their parents. *The Cashew and Cocoa Journal, 3*(3): 17-21.





National Identity	VTLCH-5 (Vittal Cocoa Hybrid-5); VTLCP 1
Institution responsible for developing variety	ICAR-Central Plantation Crops Research Institute, Regional Station, Vittal, Karnataka - 574243.
Breeding method & Parentage	Hybridization- Evaluation- Selection- Clonal evaluation- Selection Hybrid between NA 33 x ICS 89 (IC 565554 x IC 565559, the parental accessions in the CPCRI germplasm collection were acquired in the year 1982.)
Recommended	
Purpose	High yielder and best quantitative and qualitative characters
State/ecological region	Arecanut growing tracts of Western Ghats hills and plains/ coconut growing tracts of Andhra Pradesh and Tamil Nadu
Yield performance in evaluation trial	
Mean	Dry bean yield: 2.5-3 kg/tree/year Yield/ha: 1500-1800 kg (685 trees under arecanut)
Potential	Dry bean yield: 3.22 kg/tree/year
Description of variety	
Plant habit	Intermediate with medium canopy 16.3 m²
Flowering	Commences 4 years after planting in seedling progenies and 2 years in grafted/clonal progenies
Pod and Bean features	Green to Yellow colour, Elliptic pods with thick husk 66 pods/tree/year in 13 year old tree Pod index: 20 pods required to produce 1 kg dry bean No. of beans: 43/pod Bean index: 1.1 g/bean Rich in fat and fatty acids
Reaction to major pests and diseases	Moderate Incidence of <i>Phytophthora</i> pod rot and tea mosquito bug damage.
Reaction to environmental stress	Sultable for high density planting and withstands water limited conditions. Supplementary irrigation @ 20 litres/day as drip during rainless period.
Planting material production	(i) Parents will be multiplied as clones and be assembled into bi-clonal garden for hybrid seed production. (ii) Clonal multiplication of hybrids.

Recommended for release: ICAR-CPCRI Centenary year, XXV AICRPP Group Meeting – 2016 ICAR-CPCRI. 2016. KALPA CPCRI Newsletter 35 (2) April- June 2016, Central Plantation Crops Research Institute, Kasaragod, Kerala, India, pp. 2.

Elain Apshara, S. 2013. Comparative performance of selected parents and progenies as clones in South India. In: Proceedings of Malaysian International Cocoa Conference 2013, 'Innovation and Technology Driving Cocoa Productivity/ Sustainability' (Eds. Sabariah Samsudin, Samuel Yap Kian Chee and Badrul Hisyam Zainudin), 7-8 Oct, 2013, Sunway Pyramid Convention Centre, Kuala Lumpur, Malaysia. pp. 9-17. Elain Apshara, S. 2014. Performance of elite cocoa clones under coconut in double hedge system of planting. The Cashew and Cocoa Journal, 3(2): 13-16.







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