



# Genetic Resource Management and Improved Varieties of Coconut

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## Hybrid varieties

Among the five hybrids developed and released for commercial cultivation by CPCRI, the hybrid Kalpa Samrudhi is relatively tolerant to drought and is recommended as a dual purpose variety for copra and tender nut purpose. The hybrid Kalpa Sankara is tolerant to coconut root (wilt) disease and recommended for cultivation in the root (wilt) affected tracts.

### **Chandra Sankara:**

Chandra Sankara was the first hybrid developed at the institute to be recommended for commercial cultivation in the year 1985 and is the most popular Dwarf x Tall hybrid in the country. This hybrid was produced by crossing Chowghat Orange Dwarf palms (female parent) with pollen from elite West Coast

In India, heterosis breeding has been employed for development of hybrid coconut varieties through hybridization between indigenous and exotic selections of Talls and Dwarfs. The first coconut hybrid in the country was produced at the erstwhile Coconut Research Station, in 1934 by Dr. J.S. Patel using West Coast Tall as female parent and Chowghat Green Dwarf as male parent.

Chandra Laksha is the first Tall x Dwarf hybrid recommended for commercial cultivation by CPCRI and is a cross between Lakshadweep Ordinary Tall as female parent and Chowghat Orange Dwarf as male parent. The palms of this variety are tall in habit, with circular canopy. The hybrid comes to bearing in about 4-5 years after planting.



Tall palms (male parent). The palms come to bearing early when compared to tall WCT parent. The palms of this variety are semi tall in habit, with circular canopy. The average time taken for flowering is about 3- 4 years, under favourable growth conditions. The fruits are round in shape and brown in colour. It is a heavy yielder and produces, on an average, 110-123 nuts/palm/year, with an estimated copra yield of 25-28 kg copra/palm/year or 4.40-4.82 t copra/ha and 2.99 t oil/ha. The hybrid progenies can easily be identified in the nursery, since the hybrid seedlings exhibit vigorous growth coupled with bronze-coloured petioles.

The fruits are medium-sized and the mean copra content is around 208-225 g and the oil

content in copra is 64-68 per cent. Chandra Sankara is susceptible to drought and hence irrigation is required during the summer months. The hybrid performs better under good management conditions and is not recommended for cultivation in rainfed plantations. Chandra Sankara developed by CPCRI was also found superior to the local check, WCT in the AICRP on Palms centres and hence the VII Biennial Workshop of the All India Coordinated Research Project on Palms, in the year 1985, has recommended this hybrid variety, Chandra Sankara, for large scale commercial cultivation in the states of Kerala, Karnataka and Tamil Nadu

#### **Chandra Laksha:**

This is the first Tall x Dwarf hybrid recommended for commercial cultivation by CPCRI and is a cross between Lakshadweep Ordinary Tall as female parent and Chowghat Orange Dwarf as male parent. The palms of this variety are tall in habit, with circular canopy. The hybrid comes to bearing in about 4-5 years after planting. The mean annual yield is 109 nuts per palm with an estimated copra yield of 21.3 kg copra/palm/year. Under irrigated conditions and good management, the hybrid variety Chandra Laksha produces higher average yield of 175 nuts per palm per year with estimated yield of 30.10 kg copra/palm/year (5.26 t copra/palm/year) and 3.37 t oil/palm/year.



The fruits are oval in shape and medium-sized with a copra content of 195 g per nut and copra oil content of 69 per cent. This hybrid performs better than Chandra Sankara and Kera Sankara under moisture stress situation.

This hybrid has been released by CPCRI VII Biennial Workshop of the All India Coordinated Research Project on Palms, in the year 1985, for cultivation in Kerala, Karnataka and Tamil Nadu, based on the superior performance of this hybrid under evaluation at CPCRI Kasaragod and coordinating research centres at Arsikere in Karnataka and Veppankulam in Tamil Nadu.

**Kera Sankara:**

This is a popular Tall x Dwarf hybrid between West Coast Tall as female parent and Chowghat



Orange Dwarf as male parent. The hybrid palms are precocious and exhibit higher productivity than the parents. The palms of this variety are tall in habit, with circular canopy. The palm comes to bearing by the 4th year of planting. The

mean annual yield of nuts is 108 with an estimated copra yield of 20.2 kg copra/palm/year. The fruits are oval in shape.

The fruits are medium-sized and the average copra content is 187 g/nut with 68 per cent oil in the copra.

This hybrid gives higher yields under good management and irrigation. However, Kera Sankara, unlike Chandra Sankara, can also perform well under rainfed conditions. This hybrid proposed by CPCRI was recommended by the X Biennial Workshop of the All India Coordinated Research Project on Palms, in the year 1991, for large scale commercial cultivation in Kerala, coastal Andhra Pradesh and coastal Maharashtra based on the superior performance at CPCRI and the AICRP on Palm centres.

**Kalpa Samrudhi:**

Kalpa Samrudhi is a high yielding, drought tolerant, semi tall Dwarf x Tall (DxT) hybrid involving MYD as the female parent and WCT as the male/pollen parent. It is a dual-purpose variety, suitable for cultivation as copra and tender nut variety. The palms of this variety are semi-tall with compact spherical canopy. The palms are regular bearers and commence flowering 5 years after planting, under rain fed conditions. However, under irrigated conditions, the palms commence flowering within 4 years after planting. The colour of the leaf petiole and fruits is green. The fruits are oval in shape, while the dehusked fruits are round in shape. The average annual nut yield of this variety is 117 nuts/palm/annum, under rain fed conditions, with an estimated annual copra yield of 4.5 tons/ha and oil yield of



3.04 tons/ha. The variety is superior to Chandra Sankara, the earlier released D x T hybrid, and the annual average nut, copra and oil yield per hectare is 30.27%, 66.05% and 73.71% higher than Chandra Sankara, respectively. The seed nuts germinate early and produce vigorous seedlings.

The average weight of the fruits of this variety is 1032.33 g with average copra content of 219.46 g and copra oil content of 67.5%. The oil extracted from the copra of this hybrid has 45.4% lauric acid. The quantity of tender nut water is around 346 ml/nut with good tender nut quality (TSS - 6.0 Brix). The nutritive value of tender nut water is as follows: total sugars - 4.17 g/100ml; free amino acids -2.08 mg/100ml; Potassium - 2370 ppm; Sodium - 35.1 ppm.

Kalpa Samrudhi has distinguishable characters of green petiole colour, high collar girth, presence of split leaves, broad leaflet, thick inflorescence stalk girth, green coloured fruits, thick fresh endosperm and high shell weight. Kalpa Samrudhi is also relatively drought tolerant when compared to Chandra Sankara, based on physiological parameters. Further, the seedlings of this variety recorded higher nitrogen use efficiency when compared to Chandra Sankara. Considering the superior performance of the variety at CPCRI, Kasaragod in Coastal Kerala and AICRPP Centre, Kahikuchi, Assam, Kalpa Samrudhi was recommended for cultivation in the states of Kerala and Assam by XIX Biennial Workshop of the All India Coordinated Research Project on Palms in 2009. The variety has been approved for release by the Central Sub-committee on Crop Standards, Notification and Release in 2012, for cultivation in

the states of Assam and Kerala and notification of Ministry Agriculture (Department of Agriculture and Co-operation) is awaited.

#### **Kalpa Sankara:**

Kalpa Sankara coconut hybrid was produced in 'hotspots' of root (wilt) disease by crossing root



(wilt) disease-free Chowghat Green Dwarf female parents with pollen of root (wilt) disease-free West Coast Tall male parents and was found to be a high yielding root (wilt) disease tolerant variety suitable for cultivation in the root (wilt) affected tracts in the country. The palms of this variety are semi-tall in nature with precocious bearing habit. The palms attain a height of around 4.98 m at 18 years of age and come to flowering 3-4 years after planting. The agronomic features of this variety are its high yield, early bearing nature and tolerance to root (wilt) disease. The quantity of tender nut water is 373 ml and sweet in taste.

Kalpa Sankara requires adequate plant protection measures against major pests particularly red palm weevil when large scale plantings are adopted.

Drought tolerance studies using different coconut hybrids reveals that tolerance to moisture stress was significant in CGD x WCT. The hybrid gives better yield under rain fed conditions in farmer's plots in the root (wilt) disease prevalent tract. Considering the superior performance of the hybrid coconut variety Kalpa Sankara at CPCRI Regional Station, Kayamkulam, located in the root (wilt) diseased tract, the variety was proposed for release by CPCRI and recommended by XIX Biennial Workshop of the All India Coordinated Research Project on Palms in the year 2009 for release for cultivation in the root (wilt) affected tracts in the country. Kalpa Sankara was released and notified for cultivation in the root (wilt) affected tracts of the country by the Central Sub-committee on Crop Standards, Notification and Release vide Notification of Ministry of Agriculture (Department of Agriculture and Co-operation) S.O. 456 (E) dated March 16, 2012.

#### **Kalpa Sreshta:**

Kalpa Sreshta is a high yielding, Dwarf x Tall (DxT) hybrid involving selections from MYD as the female parent and selections from WCT as the male/pollen parent. The female parent palms are dwarf, takes 38 months for flowering, bears bright yellow fruits and has yellow petiole colour. The male parent palms are tall, bearing green fruits and takes about 87 months for flowering. Kalpa Sreshta is a dual-purpose variety, suitable for cultivation as copra and tender nut variety. The palms of this variety are vigorous in growth, tall in plant habit and attain an average height of 10.05m 23 years after planting. The palms are without prominent bole. The colour of the petiole is green. The variety Kalpa Sreshta is characterized by vigorous growth habit, higher rate of spathe production, high nut yield; green coloured fruits; more female flowers/inflorescence and tender nuts having more water with good taste. The fruits of this variety are oval shaped, with the dehusked fruits being round in shape. The palms of the variety Kalpa Sreshta are regular bearers and commence flowering in 6-7 years after planting. However, under irrigated conditions, the palms are expected to commence flowering within 4 years after planting. The average annual nut yield of this variety is 167 nuts/palm/annum, under irrigated conditions, with an estimated annual high copra out turn of 35.9 kg/palm/year (6.28t/ha copra). The variety Kalpa Sreshta is superior to Chandra Sankara, the earlier released D x T hybrid (COD X WCT), and gives 35.75% more nut yield and 30.29% more copra yield over Chandra Sankara.

No major pest attacks and disease outbreaks have been observed under field conditions at Kasaragod, Kerala and Arsikere, Karnataka. However, the Kalpa Sreshta variety, with a disease score of about 11% is categorized as moderately susceptible to grey leaf blight caused by *Lasiodiplodia theobromae* and stem bleeding caused by *Thielaviopsis paradoxa*.

The average quantity of tender nut water in the variety Kalpa Sreshta is 368 ml. Based on the organoleptic test; the tender nut water is classified as “good” in taste with a TSS of 5.890 Brix, with total sugar content of 5.81g/100ml and amino acid content of 1.34g/100ml. The tender nut water has Na content of about 33.3 ppm and K content of 2081 ppm. The average weight of the fruits of this variety is 940.09 g with weight of husked fruit being 610g. The average copra content is around 215 g and copra oil content is about 64.1%.

The hybrid Kalpa Sreshta is found to be high

yielding under irrigated conditions both at CPCRI Kasaragod and at AICRPP Centre, Arsikere and hence is recommended for cultivation in the coconut growing tracts of Kerala and Karnataka by the XXIII Workshop of the All India Coordinated Research Project on Palms during July 2013. Kalpa Sreshta will help in enhancing the coconut productivity as this hybrid gives an average yield of 29227 nuts per ha which will provide 6.28 tons copra per ha.

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