Improved Coconut Varieties Suitable for Quality Ball Copra Production

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Coconut (Cocos nucifera) palm is a most useful palm in the world, which gives all that is necessary for human life. Hence, in India coconut palm is endearingly called 'Kalpavriksha' meaning the tree of heaven. It is cultivated in most of the tropical countries as a commercially important tree and they produce many economically valuable products to the world including edible oil, copra, refreshing drink, fiber, charcoal and a variety of miscellaneous products for domestic and industrial use. The crop significantly contributes to the national economy in view of its contribution to the rural employment generation.

In India, coconut is grown in an area of 2.08 million hectares, across 18 states and three Union Territories. Traditional areas of coconut cultivation in India are in the states of Kerala, Tamil Nadu, Karnataka, Goa, Andra Pradesh, Maharashtra, Pondicherry, Orissa, West Bengal, Islands of Lakshadweep and Andaman and Nicobar. India ranks among the top three coconut producing countries in the world, with an annual production of 20,736 million nuts(CBD, 2020-21).Of the total production of coconuts in the country, about 91 percent was used as mature coconuts, out of which, 30 percent was for domestic consumption and 69 percent for industrial usage. Out of the industrial use, about 80 percent was converted to copra, of which about 31 percent as ball copra and 69 percent as milling copra to produce coconut oil for edible, toiletry and other purposes. The remaining 20 per cent was for other industrial uses i.e. for production of value-added products like desiccated coconut, virgin coconut oil, coconut milk/cream, slice/grated/dry coconut, etc. (CAC&P 2022).

Copra the dried kernel of coconut produced from the fresh nut which has been shelled and dried is a very important commercial product comes next to coconut oil in terms of production and usage. In India, two types of copra are produced one is milling copra and another is edible copra. Milling copra comprises of cups and chips mainly used to extract oil whereas edible copra/ ball copra is usually a fine grade, well-dried whole of the coconut kernel and is used in various food preparations are consumed as dry fruit and mostly used for religious purposes as well as in traditional medicines preparation.

Ball copra from Tiptur Tall coconut variety

In our country, states like Kerala and Tamil Nadu producing nearly 92% of total domestic production of milling copra. Of which, Kerala had the largest share and accounted for 47 percent of total milling copra production while the share of Tamil Nadu was 44.6 percent and Karnataka 4.5% during the year 2021-22. In case of edible/ball copra, Karnataka accounted for 65.5 percent of total production, while Kerala's share was 13.5 percent and Andhra Pradesh's share was 10.3 percent. In Karnataka, nearly, 60 % of the coconut produced is consumed as raw and 25% are converted into edible ball copra and desiccated coconut powder.

The top three producers accounted for more than 96 percent of total milling copra and 89.3 percent of edible copra production in the country(CAC&P 2022).

For edible ball copra, Tiptur and Arsikere in Karnataka and Vadagara in Kerala are the two main biggest wholesale markets in India. Ball copra, prepared in Vadagara is referred as ''Calicut Gola'' in trade and they are classified into five types according to the size. Ball copra produced in Karnataka are graded into four groups based on the size such as, "Mysore", "Madras", "Ras" and "Barik" and rejected edible copra is called kavathu. These grades are not defined in any measurable unit but classified only based on the visual assessment. Ball copra from Godavari district is referred to as Madras copra which is not as good as Karnataka or Vadagara varieties. The ball copra from vadagara and kozhikode areas is considered slightly inferior to that of Tiptur area of Karnataka(Ayoob, 2004).

Traditionally, edible ball copra is prepared by more than 12 months old whole nuts, immediately after harvest are stored in gardens for 5-6 weeks, subsequently they are partially dehusked and stored on a raisedbamboosplatform, inside a shed for a period of about 8-12 months. It is also dried by passing hot air especially for the nuts harvested during monsoon season. The nuts harvested in summer season are sun dried and converted into ball copra. During this time, coconut water is absorbed by the kernel and dries out slowly and loosens itself from the shell. Later by de husking and de shelling separates the dry kernel in ball form which is relatively softer, sweet and oily with moisture content below 7 percent.

Earlier, demand for ball copra is limited to winter season starting from November to January in a year. But recent years, demand for the edible ball copra increased from North Indian states like Delhi, Ahmadabad, Kolkata, Pune, Rajasthan, Mumbai, Jaipur, Patna, Nagpur, Cuttack, Indore, Puri, Guwahati, etc. when it started using in the preparation of sweets, bakery products and confectionaries. Hence, ball copra is gaining popularity in both traditional and nontraditional areas, thus opening new vistas for coconut entrepreneurs to invade the widening market for ball copra in our country.

In order to meet out the raising market driven demands for the ball copra it is necessary to increase the production of the quality coconuts suitable for the production of ball copra in the country. In this regard ICAR- Central Plantation Crops Research Institute, Kasaragod a premier research institute in the National Agricultural Research Systems of India is continuously evaluating the available germplasms, accessions and hybrids in the institute and identified better lines and hybrid combinations which are high yielding and suitable for the ball copra production and released for the cultivation in different agro ecological regions of the country. Similarly, AICRP on palms, Arsikere Centre also developed a hybrid suitable for ball copra production. Detailed information about varieties suitable for the production of ball copra is discussed below (Chowdappaet al., 2017).

Varieties suitable for the production of ball copra

Kera Keralam: A tall variety, selection from a population of West Coast Tall (WCT) from Kerala. The palms are sturdy with compact spherical crown and yields economically for about 75 years or more. It is a high yielding variety, regular bearers, moderately resistance to leaf spot disease, tolerant to moisture stress and suitable for the production of copra and oil. The nuts

of this variety are highly suitable for preparation of ball copra, since only9.09% spoilage is observed in this variety during the process of ball copra production. Fruits are green yellow, medium size and oval with copra content of 176 g/nut with copra oil content of 68%. Potential copra yield is 6.56 t/ha/year. The palms normally come to bearing in about 6-7 years, under rainfed conditions. However, under favorable conditions of irrigation and ample sunlight, early flowering within four years of planting has been recorded. The average annual yield under rainfed condition is 80 nuts per palm. This is recommended for cultivation in states like Kerala, Tamil Nadu and West Bengal.

Kalpatharu: A tall and high yielding variety, highly suitable for the production of quality ball copra, relatively tolerant to moisture deficit stress, basal stem rot and leaf blight. This variety is a selection from population of Tiptur Tall from Karnataka. The palms of this variety are tall with circular crown and are regular bearers and have an economic life span of up to 80 years, under favorable conditions. The average time taken for flowering in the population is about 6 years, under rain fed conditions. The shape of the fruit is oval with husked nuts being round in shape. The average fruit weight of this variety is around 958 g, with copra content of 175

g/nut and oil content in copra is 67.2%. The variety is especially suitable for ball copra production, as spoilage percentage (3.92%) during the process of ball copra production is lower as compared to other released varieties.

Approximately 5600-6800 nuts are required to make one tonne of copra. This gives potential copra yield of 4.56 t/ha/year. The variety is relatively tolerant to drought and suitable for cultivation under both rainfed and irrigated regions of Karnataka, Tamil Nadu and Kerala.

Kalpa Mitra: It is a tall, high yielding, regular bearing variety, selection from a population of Java Tall from Indonesia, tolerant to moisture stress and suitable for the production of ball copra and oil. The palms of this variety are tall in habit with stout trunk and spherical canopy with large number of leaves. The palms are regular bearers and commence flowering 7-8 years after planting in the field, under rainfed cultivation. Its fruits are large, oval and average weight is 1001.19g and, on an average, 241.14g of copra (dried endosperm) per fruit can be obtained. The copra contains about 66.50% of oil. It has the potential to give yield of 5.41 t/ha/year. This variety is suitable for the cultivation in the states like Kerala and West Bengal.

Chandra Kalpa: It is a selection from Lakshadweep Ordinary (LCT), an indigenous coconut cultivar from Lakshadweep Islands. It resembles WCT in growth habit and fruit characters.However, the fruits of this variety are comparatively smaller and angular with three prominent ridges seen on the mature fruits. The fruit colour varies from greenish yellow to yellow-green. The average annual yield is 100 nuts/palm and the estimated copra yield of 17 kg/palm/year. Fruits are medium sized with an average fruit weight of 800 g, copra content of 176 g/nut and copra oil content of 72%. About 6000 to 7000 nuts are required to make one tonne of copra. The palms of this variety are also good for tapping 'neera' (inflorescence sap), which can be consumed as such or converted to palm sugar/ jaggery. This variety is suitable for the cultivation in the states like Kerala, Karnataka, Andhra Pradesh, Tamil Nadu and Maharashtra.

KalpaSreshta: A high yielding, dual purpose hybrid developed by crossing Malayan Yellow Dwarf (female parent) and Tiptur Tall (male parent) variety suitable for the production of premier quality ball copra as well as for tender nut production. The palms of this variety are vigorous in growth, tall in plant habit. The fruits of this variety are oval shaped with good quality tender water (368 ml) and the dehusked fruits being round in shape give 216 g copra/ nut. The palms of the variety KalpaSreshta 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). It is recommended for cultivation in Karnataka and Kerala.

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 Tall palms (male parent), suitable for copra and tender nut production. The palms of this variety are semi tall in habit, with circular canopy. The palms come to bearing

early when compared to tall WCT parent. It bears brown, medium size fruits with 208-225 g of copra per nut and the oil content in copra is 64-68 per cent. The average time taken for flowering is about 3- 4 years, under favorable growth conditions and yields copra of 7.74t/ ha/year and 2.99 t oil/ha. This variety is sensitive to low moisture stress and performs well under irrigation and good management. This hybrid is recommended for cultivation in Kerala, Karnataka and Tamil Nadu.

Kera Sankara: A high yielding dual purpose hybrid variety developed by crossing West Coast Tall as female parent and Chowghat Orange Dwarf as male parent. The palms of this variety are tall in habit, with circular canopy. The palm comes to bearing by the 4th year of planting. The variety bears brown, medium sized, oblong fruits with

187 g copra/ nut with 68 per cent oil in the copra. It yields copra of 7.80t/ ha/year. This hybrid can be cultivated in the states of Kerala, Karnataka, Coastal Maharashtra and Coastal Andhra Pradesh.

Kalpa Ganga: A hybrid developed by crossing Gangabondam (female parent) and Fiji Tall (male parent) suitable for ball copra production. It is a semi tall palm with circular crown, oblong shaped nuts of green color. The palms take about 4-5 years for flowering. It gives 120 nuts/palm/year and yields copra of 3.38t/ ha/year. This hybrid is recommended for cultivation in Karnataka state.

Conclusion

Most of the dwarf coconut varieties are not suitable for ball copra production. Further, some of the tall varieties released from ICAR- CPCRI such as Kera Chandra, Kalpa Pratibha, Kalpa Haritha and Kalpa Shatabdi are also unsuitable for the production of ball copra due to early germinating nature of the fruits andhence there is greater percentage of spoilage when the nuts are stored for longer period of 8-12 months which is necessary for the production of ball copra.

Quality seedlings of the improved coconut varieties suitable for ball copra production is supplied by ICAR-CPCRI, various SAUs, State Department of Horticulture and the centres under AICRP on Palms as well as the Coconut Development Board to the farmers and NGO's to facilitate the higher production/ productivity in the country.

It is advisable to plant improved varieties and hybrids which give higher yield of ball copra in order to meet the market driven demand as well enable coconut farmers to get higher net income. In addition, this will help to improve overall profitability of coconut farming and promote coconut cultivation in the country.

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