

Evaluation of coconut hybrids and varieties for tender nut under Orissa conditions

D K Dash, M R Kar* and G Subudhi

AICRP on Palms, Department of Horticulture, OUAT, Bhubaneswar, ORISSA

*Department of Plant Physiology, OUAT, Bhubaneswar, Orissa

Introduction

The most important produce of coconut is its fruit which is made up of an outer fibrous covering called the husk followed by a hard protective shell. Lining the shell is the white coconut meat or kernel and the inner cavity is filled with sweet liquid called coconut water. In the early stages of development, this water is sweet and refreshing. As the nut matures, the sweetness diminishes but retains much of its chemical components. Tender coconut water has a number of medicinal properties and it is an essential component in many Ayurvedic preparations. It is therefore important to analyse the physiochemical characters to ascertain the optimum harvest standards to obtain better quality tender nut water. The present investigation was an attempt to generate valuable information on tender nut quality of different genotypes of coconut grown under Orissa conditions.

Materials and Methods

The experiment was undertaken at All India Coordinated Research Project on Palms Centre at Konark. Studies were conducted on twelve varieties including hybrids of uniform age, grown under uniform soil and cultural conditions, namely

GBGD, COD, MYD, MOD, MDG, Kenthali, LCM, LCT, Sakhigopal (SKL), GBGD x ECT, WCT x GBGD and COD x SKL. The experiment was laid out with randomised block design with 3 replications and 6 palms per replication. The inflorescence was tagged properly and labeled at button stage. The nuts were harvested at regular intervals of one month from the button stage till the nine month. Three samples were taken at random from each genotype per replication. The physical parameters were recorded from button stage and the nut water analysis was undertaken from the fifth month. The physical parameters were observed by standard methods to measure volume of water (ml) and weight of endosperm (g). The bio-chemical observations such as total sugar content was estimated following the method of Dubios *et al.*(1951) and recorded in g/100 ml. The free amino acid content was estimated following the method of Yapinlee *et al.*(1966) and recorded in mg/100 ml. The sodium and potassium were estimated by using Flame Photometer after diluting nut water (Jackson, 1973) and its content was recorded in ppm. The T S S was estimated by Inabbe Refractometer and recorded as degree brix (^oB).

The present investigation has revealed that nuts at sixth to seventh month of development are ideal for tender coconut purpose. In coastal area of Orissa, hybrid varieties like WCT x GBGD, GBGD, COD x SKL, Kenthali and MOD are found to be suitable as tender nut for their high volume of water.

Results and Discussions

The formation of liquid endosperm of nut water was observed from the second month in GBGD and COD while it was recorded for other hybrids and varieties from the fourth month. The volume of water was found to increase till the seventh month of nut development in all the cultivars and it declined thereafter. The decrease in nut water may be due to adsorption by developing endosperm, from the eighth month onwards. Thampan 1975, Panda 1988 and Jayalekshmy *et al*, 1986 reported similar findings. Maximum volume of nut water was recorded during the seventh month of nut development in WCT x GBGD (581.7 ml) followed by GBGD(515ml), COD x SKL (486.7ml), Kenthali (465ml), MOD (418.3ml), SKL (373ml) and LCO (368ml). In most of the cultivars the volume of water was increased in seventh month to one and half time

when compared to five month old nut. Based on this facts, the nuts can be harvested during seventh month for getting maximum tender nut water (Table 1.)

The kernel initiation in the form of thin layer of jelly inside the endocarp was noticed during the fifth month of nut development in all the hybrids and varieties except MYD and Kenthali where kernel initiation took place during the sixth and seventh month respectively. Thampan (1975) reported about kernel initiation taking place at about 160 days. Irrespective of cultivars, kernel weight increased gradually. Similar results were obtained by Chikkasubbanna *et al* (1990) under Karnataka condition. It was observed that during the seventh month of nut development the cultivars like Kenthali(19.8g), LCM (50g) and MYD(51.2) contained lower amount of kernel. Moderate amount of kernel was recorded in COD (81.2g),

GBGD x ECT (99.2g), MGD (100.8g), SKL (100.8), MOD (101.5), COD x SKL(103.1) whereas high quantity of kernel was recorded in GBGD (124g), WCT x GBGD (131.3g) and LCO(134.8G).

The concentration of sodium (Na) and potassium (K) increased up to the seventh month of nut development and then decreased. The total sugar content in nut water was recorded higher in LCM (29.5g/100 ml), MYD(21.6g/100ml) and Kenthali (19.2/100ml) and COD (14.6g/100ml) as compared to other hybrids and varieties at seventh month. Ratnambal (1999) has recorded that tender nut at 7 month stage may contain 30g sugar. At the similar stage of nut development, minimum concentration was recorded in MOD (3.3g/100ml). In rest of the cultivars LCT, GBGD x ECT, SKL, GBGD, MGD, WCTx GBGD, CODx SKL and COD, total sugars content ranged between 4.5 and 14.6g/100ml. In

Table 1. Tender nut water composition of varieties and hybrids at seventh month growth stage.

Varieties/ Hybrids	Nut water ml	Kernel weight g	TSS °B	Total sugar g/100ml	Free Amono Acid mg/100ml	Na ppm	K ppm
GBGD	515.0	124.0	3.0	7.65	7.89	483.3	2750.0
COD	333.3	81.2	3.0	14.6	9.82	470.0	3770.8
MGD	323.3	100.8	3.5	7.7	14.10	510.0	2770.8
MOD	418.3	101.5	3.0	3.3	4.5	866.6	2750.0
MYD	350.0	51.2	3.0	21.6	16.12	703.3	2875.0
Kenthali	465.0	19.8	2.5	19.2	9.15	613.3	3708.3
LCM	238.3	50.0	2.0	29.5	26.32	440.0	5833.3
LCT	368.3	134.8	2.0	4.5	13.50	476.6	5562.5
SKL	373.3	100.8	2.0	6.9	12.48	566.6	3416.6
GBD x ECT	360.0	99.2	3.5	5.4	8.40	460.0	5291.6
WCT x GBD	581.6	131.3	3.5	8.9	8.25	696.6	4750.0
COD x SKL	486.6	103.1	3.0	9.00	9.37	666.6	2750.0
SE (m)	5.16	1.992	NS	0.713	0.529	7.301	100.175
C.D. (0.05)	15.12	5.831		2.088	1.548	21.368	293.209



general, the sugar content increased at a faster rate till seventh month and decreased thereafter. Kamladevi and Velayudan, 1978 recorded a similar trend in sugar content in coconut.

Maximum content of free amino acids was recorded in LCM (26.33mg/100 ml), followed by MYD(16.13 mg/100ml), MGD (14.1mg/100ml) and LCT(13.5mg/100ml) whereas minimum free amino acid was observed in MOD(4.5mg/100 ml). In rest of the hybrids and varieties GBGD, LCT, GBGDxECT, Kenthali, COD x SKL, COD and SKL, free amino acid content ranged between 7.89mg/100ml and 12.49mg/100ml. The free amino acids in coconut water increased at a faster rate till the seventh month in most of the hybrids and varieties and declined thereafter. Similar trend of free amino acid concentration in different stages of nut development was reported by Gunawardena 1973, Poduval *et al* 1978, Chikkasubbanna *et al* 1990.

The TSS of different hybrids and

varieties gradually increased till the eighth month and later declined. Maximum TSS was recorded in COD(4.5°B) and minimum was recorded in Kenthali(2.5°B). GBD and MGD recorded 5° Brix at eight month of nut development. Chikkasubbanna *et al*(1990) and Poduval *et al* (1998) recorded similar trend in coconut.

Conclusion

The present investigation has revealed that nuts at sixth to seventh month of development are ideal for tender coconut purpose. In coastal area of Orissa, hybrid varieties like WCT x GBGD, GBGD, COD x SKL, Kenthali and MOD are found to be suitable as tender nut for their high volume of water. The genotypes MOD, MYD, COD, LCT and SKL registered moderate quantity of nut water with optimum content of K, Na, total sugars and free amino acids where as LCM, GBGD, LCT, COD, GBGD x ECT and MGD recorded low Na content.

References

- Chikkasubbanna, V, Jayaprasad K V, Subbaiahthilak and Poonacha 1990. Effect of maturity on chemical composition of tender coconut water, *Indian Coconut Journal*, 20 (12) 10-13
- Gunawardena, M 1973, A study of the liquid endosperm of coconut. *Ceylon Coco Q 24*, 102-106.
- Jayalekshemy A, Arumughan C and Narayanan C S 1986. Changes in chemical composition of nut water and kernel during development of coconut. *Proceedings of PLACROSYM 1*, 340-346.
- Kamaldevi CB, and Velayudhan M 1978, Changes in chemical composition during different stages in developing coconut. *Proc. 1st Int. Conf. Coconut Res Workshop in India, Ernakulam*. 132-151.
- Poduval M, Md Abu Hussan and Chattopadhyay, PK 1998. Evaluation of coconut cultivars for tender water for W B, *Indian Coconut J*. 29(1) 3-6.
- Ratnambal M J 1999. Varieties suitable for tender coconut. *Indian Coconut J*. 30(5) 64-67.
- Thampan P K 1995 *Hand Book on Coconut Palm*. Oxford & IBH Publishing co Pvt Ltd p 15.
- Vijayan K P, Louis I Henry, Chandrasekar N R and Jayaraman C 1977. K content in nut water of 31 coconut varieties and hybrids. *J Plantation Crops* 5(2) 123-124.

UNDP Project

A new project has been sanctioned by UNDP as part of Global Environment Facility for reviving coconut and coir-based economy of the Pattanakkad Block of Alappuzha District in Kerala. The project period is 30 months, effective from July 2007, and the UNDP assistance is Rs. 22.5 lakhs. A similar project was under implementation in the Vayalar Panchayat, in Kerala since 2004 and in appreciation of the excellent performance of this project it has now been up-scaled and sanctioned to cover eight Panchayats falling under the Pattanakkad Block. Peekay Tree Crops Development Foundation, a Kochi-based NGO headed by Shri. P.K.Thampan, will implement the project.

The major activities envisaged under the project are (1) to plant around 50,000 medicinally important tree species as intercrops in coconut holdings in 2,000 farm-households to cover an effective area of 300 hectares, (2) to promote intensive integrated farming in coconut holdings to cover an effective area of 50 hectares, (3) to organize 8 community nurseries for coconut and medicinal plants, (4) to establish one coir pith composting unit with capacity to process around 4 tonnes of pith daily, (5) to establish one coir-based geotextile and mats and matting unit, (6) to distribute not less than 100 motorized coir-spinning wheels to generate regular employment for 200 women, (7) to introduce biomass fired copra dryers, (8) to promote coconut-based food and non-food processing and similar enterprises through Self-Help Groups of men and women and (9) capacity building by imparting training in technically and economically viable farm-based production technologies.