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# Evaluation of coconut *(Cocos nucifera)* for tender nut quality in Maidan tracts of Karnataka

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**ABSTRACT**

Evaluation of coconut (*Cocos nucifera* L.) varieties for growth and tender nut quality was carried out at Horticulture Research and Extension Centre (UHS, Bagalkot), Arsikere, Karnataka. The highest palm height (2.35 m) was recorded in Kalpa Dhenu, whereas it was lowest (1.22 m) in COD at the age of nine years. Palm girth (101.78) and leaf length (4.73 m) were maximum in variety Kalpatharu. Higher amount of tender nut water (605 ml/nut) in Kalpa Dhenu, whereas, Gautami ganga (551.7 ml/nut) and COD (520 ml/nut) had optimum quantiy of water. Gauthami Ganga recorded highest TSS (6.1°Brix) and lowest titrable acidity (0.05%). COD recorded maximum total sugars (6.79 g/100 ml) and lowest acidity (0.05%). Gauthami Ganga had optimum quantity of mineral content (61.47 mg/100 ml calcium, 10.87 mg/100 ml magnesium, 2023.33 ppm potassium and 23.33 ppm sodium). Organoleptic evaluation indicated that Gauthami Ganga (8.5) and COD (7.23) were the best for tender nut purpose as both of them ranked good for taste of water.

**Key Words**: Tender nut, Organoleptic, Mineral content, Plant height, TSS, Bevarage

Coconut (*Cocos nucifera* L.) is a monocotyledonous palm. Tender coconut water is a refreshing and hydrating drink. It has a unique composition of vitamins, minerals, amino acids, phytohormones and sugars. Chemical composition and volume of nut water change during maturation (Jayalakshmi *et al.,* 1986). Quality and quantity of coconut water as well as consumer acceptability of tender nut is more at 7 months of maturity (Sudarsana Rao *et al.,* 2008). Evaluationof varieties suitable for tender nut is an important area in the circumstances of importance of natural beverages in recent pasts. Research work on evaluation of recently released varieties suitable for tender nut purpose is meagre and hence this study was undertaken to see the performance of different varieties for tender nut quality in maidan tracts of Karnataka.

## MATERIALS AND METHODS

The experiment was conducted at Horticulture Research and Extension Centre, Arsikere, (UHS, Bagalkot) during 2020-2021. The material consisted of 10 varieties, *viz.* Kera Keralam, Kera Bastar, Konkan Bhatye Coconut Hybrid-1, Kalpa Dhenu, Kalpa Pratibha, Kalpa Mitra, Kalyani Coconut-1, Kalparaksha, Gauthami Ganga and Chowghat Orange Dwarf with the control variety Kalpatharu of nine-year-old palms. The randomized complete block design with three replications was used. The varieties were planted at a distance of 7.5 m × 7.5 m. Recommended package of practices were followed for all the varieties. The palm height and girth were recorded from April 2021 to April 2022 and number of functional leaves, total leaf length, petiole length and number of leaflets were recorded during April 2021. The tender nut samples were randomly selected from each replication at the age of seven months.

The TSS was recorded with portable refractometer and pH of nut water was determined with digital pH meter. The total free sugars were calculated using a calorimeter and nitrogen estimation by Lowry's method. Minerals like potassium and sodium were estimated using a flame photometer. Phosphorus was determined using spectrophotometer. Calcium and magnesium levels in tender nut water were measured using an atomic absorption spectro-photometer

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(Tondon, 1993). With the use of a nine-point hedonic scale (Amerine *et al.*, 1965) for overall acceptability, a sensory evaluation of tender coconut water of different varieties was carried out by a 10-member semi-trained panel.

## RESULTS AND DISCUSSION

There was significant difference in palm height and palm girth at one year intervals. The maximum palm height (2.35 m) was observed in Kalpa Dhenu, followed by Kera Bastar (2.01 m) during October 2020. The lowest palm height (1.22 m) was recorded in COD. During October 2021, maximum palm height (2.45 m) was recorded in the Kalpa Dhenu, followed by Kera Bastar (2.11 m) and minimum palm height in COD (1.29 m). There was an increase in 0.10-0.07 m (7-10 cm) length in palm height during one year. The results are in conformity of Bhalerao *et al.* (2016), Ramanandam *et al.* (2018), Tripura *et al.* (2018) and Mohanalakshmi and Arunkumar (2019).

During October 2020, highest palm girth (101.78 cm) was recorded in Kalpatharu, whereas lowest palm girth (74.55 cm) was recorded in COD. During October 2021, maximum palm girth (102.01 cm) was recorded in Kalpatharu and lowest in COD (74.75 cm). There is an increment of 0.18-0.46 cm in palm girth. Similar results were obtained by Tripura *et al.* (2018) and Nath *et al.* (2017).

The number of leaves was maximum in Gauthami Ganga (22.4) and lowest number in COD (20.2). The maximum leaf length (4.73 m) was in Kalpatharu, whereas Gowthami Ganga recorded least length (3.98 m). The highest petiole length was recorded in Kalpa Dhenu (154.78 cm), whereas COD recorded least petiole length (119.56 cm). Similar findings were also reported by Nath *et al.* (2017), Ghoshand Bandopadhyay (2015) and Ramanandam *et al.* (2018).

Tender nut water content was significantly highest in Kalpa Dhenu (605 ml) and lowest in Kalyani Coconut-1 (325 ml). Apshara *et al.* (2007) reported the large quantity of nut water in COD (358.8 ml), followed by COD × WCT (347.2 ml). Similar findings were also reported by Poduval *et al.* (1998) and Mali *et al.* (2004).

The TSS of tender nut water was maximum in Gauthami Ganga (6.1°Brix), followed by COD (5.77°Brix) (Table 1). The synthesis and accumulation of sugars could cause an increase in TSS in tender nut water. However, Kalyani Coconut-1 recorded the lowest TSS (3.9°Brix). According to Nandanasabapathy and Kumar (1999), TSS was maximum in Chowghat Green Dwarf (5.17°Brix), followed by Chowghat Orange Dwarf (4.90°Brix) and minimum in Tiptur Tall (4.56°Brix). Ghosh and Bandopadhyay (2015) also reported similar findings of TSS in tender water.

**Table 1. Performance of coconut varieties with respect tender nut water**

| Treatment | Volume of water (ml/nut) | TSS (°Brix) | pH | Titrable acidity (%) | Total sugars (g/100 ml) | Protein (%) | Phosphorous (mg/100 ml) | Sodium (ppm) | Potassium (ppm) | Calcium (mg/100 ml) | Magnesium (mg/100ml) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $T_1$: Kera Keralam | 448.3 | 5.10 | 4.91 | 0.07 | 4.82 | 0.91 | 11.81 | 22.63 | 2099.00 | 63.20 | 12.53 |
| $T_2$: Konkan Bhatye Coconut Hybrid-1 | 300.0 | 5.50 | 4.87 | 0.05 | 4.93 | 0.77 | 7.79 | 22.63 | 2110.00 | 63.47 | 10.30 |
| $T_3$: Kera Bastar | 500.0 | 4.60 | 4.83 | 0.07 | 5.14 | 0.99 | 10.54 | 21.53 | 2072.33 | 62.60 | 12.30 |
| $T_4$: Kalpatharu | 401.7 | 4.90 | 4.76 | 0.08 | 5.18 | 1.04 | 7.34 | 32.53 | 2933.33 | 73.40 | 12.87 |
| $T_5$: Kalpa Dhenu | 605.0 | 5.10 | 4.99 | 0.06 | 5.05 | 0.99 | 11.05 | 24.53 | 2659.00 | 47.60 | 12.63 |
| $T_6$: Kalpa Pratibha | 416.7 | 3.90 | 4.74 | 0.11 | 5.76 | 0.97 | 8.41 | 21.37 | 2149.33 | 64.77 | 21.63 |
| $T_7$: Kalpa Mitra | 426.7 | 5.20 | 4.92 | 0.06 | 6.00 | 1.01 | 12.10 | 23.77 | 2134.67 | 65.40 | 8.53 |
| $T_8$: Kalyani Coconut -1 | 325.0 | 3.90 | 4.89 | 0.11 | 4.80 | 0.98 | 9.97 | 27.03 | 2343.33 | 63.10 | 8.86 |
| $T_9$: Kalparaksha | 300.0 | 4.60 | 4.88 | 0.08 | 4.57 | 0.95 | 13.88 | 19.60 | 2103.33 | 62.40 | 10.13 |
| $T_{10}$: Gauthami Ganga | 551.7 | 6.10 | 4.98 | 0.05 | 6.67 | 1.03 | 7.56 | 23.33 | 2023.33 | 61.47 | 10.87 |
| $T_{11}$: COD | 520.0 | 5.70 | 4.95 | 0.05 | 6.79 | 1.00 | 13.37 | 20.37 | 2009.33 | 61.73 | 11.00 |
| SEm± | 50.81 | 0.14 | 0.01 | 0.01 | 0.21 | 0.02 | 0.61 | 0.60 | 7.27 | 0.87 | 0.42 |
| CD @ 5% | 149.88 | 0.42 | 0.03 | 0.02 | 0.61 | 0.06 | 1.80 | 1.77 | 21.45 | 2.55 | 1.24 |
| CV (%) | 20.19 | 5.00 | 0.31 | 17.38 | 6.62 | 3.86 | 10.19 | 4.42 | 0.56 | 2.39 | 6.08 |

Maximum pH (4.99) was recorded in Kalpa Dhenu and minimum was recorded in Kalpa Pratibha (4.74). The highest titrable acidity was recorded in Kalpa Pratibha and Kalyani Coconut-1 (0.11%), whereas the lowest titrable acidity was recorded COD (0.05%) (Table 1). Similar results were reported by Sahoo et al. (2021), that the tender nut water content was maximum in hybrid GBGD × PHOT (362.0 ml / nut) and minimum in ECT (257.7 ml / nut). The TSS was maximum in ECT × GBGD and LCT × GBGD (6.9° Brix). Similar findings were also earlier reported by Apshara *et al.* (2017) and Tripura *et al.* (2018).

Total sugar content was maximum in COD (6.79 g / 100 ml) and the minimum values were recorded in Kalparaksha (4.57 g / 100 ml) (Table 1). Dhamodaran et al. (1993) also had observed the highest total sugar value (7.09 g / 100 ml) in COD and the lowest in Fiji Longtongwan (4.9 g / 100 ml). Similar findings were reported by Tripura *et al.* (2018). Kalpatharu recorded significantly higher protein content (1.04%), while lowest was found in Konkan Bhatye Coconut Hybrid-1 (0.77%). The maximum phosphorous content in tender nut water was noticed in Kalparaksha (13.88 mg / 100 ml), whereas, minimum was in Kalpatharu (7.34 mg / 100 ml). According to Mali *et al.* (2004) amongst the hybrids, T × D showed maximum phosphorous content (15.76 mg / 100 ml). The results were similar to the findings reported by Poduval *et al.* (1998) and Nakum *et al.* (2009).

The maximum sodium content was noticed in variety Kalpatharu (32.53 ppm), while, minimum was in Kalparaksha (19.6 ppm). Maximum and minimum value for potassium was recorded in Kalpatharu (2933.33 ppm) and COD (2009.33 ppm), respectively. Generally, less to optimum levels of sodium and potassium content were preferred for best tender nuts. According to Dhamodaran *et al.* (1993), potassium was minimum in COD (2003 ppm) and maximum in WCT (2797 ppm). The lowest level of sodium was recorded in COD (20 ppm) and maximum was recorded in Spikeless (38 ppm) (Mali *et al.* (2004). Kalpatharu and Kalpa Dhenu recorded highest (73.4 mg / 100 ml) and lowest (21.15 mg / 100 ml) calcium content, respectively. Kalpa Pratibha recorded significantly highest magnesium content (21.63 mg / 100 ml), whereas, it was minimum in Kalpa Mitra (8.53 mg). Similar findings were also reported by Mali *et al.* (2004); Nakum *et al.* (2009).

The highest score for tender nut water was recorded in Gauthami Ganga (8.5), ranking extremely good, followed by COD (7.23) and Kalpa Mitra (7). The lowest score (4.83) was recorded by Kalpa Pratibha. The taste of nut water, which is a result of sugar content and TSS can be attributed to its overall acceptability. According to Nandanasabapathy and Kumar (2009) highest organoleptic score was attained by COD, followed by MYD (Mali *et al.*, 2004).

## CONCLUSION

Thus, Gauthami Ganga and COD performed well for tender nut quality with dwarfness. Hence, these are suitable for cultivation in maidan tracts of Karnataka.

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