

Factors affecting optimum physiological maturity of tender coconuts

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Tender nuts are utilized for its sweet water which is a refreshing drink and its gelatinous kernel is a delicious food. Tender coconut water and tender meat is one of the natural food products to quench thirst and refresh the body by providing nutritious content. The tender coconut water is a health promoting beverage, endowed with therapeutic properties rich in minerals and vitamins. There is an immense scope for commercial production and marketing of tender coconut water. The fresh meat from tender coconut is a functional food. Coconut meat helps to regulate digestion and elimination, assists in weight loss and is a powerful germ fighter.

The cultivars having higher volume of nut water, high sugar content, lower potassium and sodium are suitable for tender coconut purpose. The composition of water depends on the variety, maturity stage of the tender nut, soil and climatic conditions. Harvesting tender coconuts at optimum physiological maturity stage having maximum quality, quantity and consumer acceptance in the right season is very important in its commercial exploitation.

i. Identification of optimum physiological maturity stage for harvesting tender coconuts

The age of the tender nut is very important to decide the quality of



tender coconut water. Among seventy five exotic and indigenous coconut cultivars available at Regional Agricultural Research Station, Pilicode, Kerala Agricultural University, fourteen coconut cultivars namely WCT (West Coast Tall), Bengal, New Guinea, Cochin China, Java, Andaman Ordy.(Andaman Ordinary), Phil. Ordy.(Philippines Ordinary), Lac. Ordy. (Laccadive Ordinary), MGD (Malayan Green Dwarf), COD (Chowghat Orange Dwarf), MOD (Malayan Orange Dwarf), MYD (Malayan Yellow Dwarf), CGD (Chowghat Green Dwarf) and GB (Gangabondam) were selected through organoleptic test. Inflorescence was tagged on the day of inflorescence opening. Sampling was done at ten day interval from

190 to 230 DAIE (days after inflorescence emergence) during summer period (March and April) for four years (2003 to 2006).

Volume of nut water is an important economic character in the consumer's acceptability and cultivar's preference for tender coconut. Maximum amount of nut water was found at 190 DAIE and then declined from 190 to 230 DAIE. The maximum amount of nut water was found in Bengal (527ml) followed by Java and Philippines Ordinary. Tall cultivars recorded more quantity of tender nut water than dwarf cultivars. TSS was found increasing from 190 to 210 DAIE and then declined from 210 to 230 DAIE. The maximum TSS found in MGD (6.5%) followed by COD, CGD and GB (6.4%) at 210 DAIE. The total sugars are the main constituents of nut water responsible for the sweet taste and showed significant differences among the cultivars. Total sugars and reducing sugars were also found increasing from 190 to 210 DAIE and then declined from 210 to 230 DAIE. The total sugars were highest in COD (6.3%) followed by MGD (6.2%) at 210 DAIE. The reducing sugars content also varied among the cultivars with CGD recording higher value (4.7%) followed by COD and MGD.

In general, dwarf cultivars recorded higher amounts of total and reducing sugars accounting for its

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sweetness and lower content of sodium, potassium contents for enhancing the consumer acceptability. Maximum tender nut quality parameters like total soluble sugars, total sugars, reducing sugars, ascorbic acid, protein, sodium and potassium were found increasing from 190 to 210 DAIE and then declined to 230 DAIE except sodium and potassium. The mean potassium and sodium contents of tall cultivars was higher compared to dwarf cultivars, irrespective of age of tender nuts. The optimum physiological maturity having maximum quality and consumer acceptance of tender nut water was found at 210 DAIE. Uniform and complete formation of four mm thickness of tender kernel with maximum consumer acceptance was also found at optimum physiological maturity.

ii. Influence of seasonal effects on quality and quantity parameters of tender coconut water:

Identification of correct season for harvesting of the tender nuts used for tender nut water purpose is an important step. Three coconut cultivars namely West Coast Tall (WCT), Gangabondam (GB) and Malayan Yellow Dwarf (MYD) cultivars were selected as tall, semi tall and dwarf cultivars, respectively for studying the influence of seasonal effects on quality and quantity parameters of tender nut water. The inflorescence tagged monthly so that samples were collected for analysis every month for two years. Sampling was done at optimum physiological maturity of tender nuts (210 DAIE) at monthly interval for two years (2005 and 2006) continuously.

Tall cultivar (WCT) recorded maximum nut water, sodium and potassium than semi tall (GB)

followed by dwarf cultivar (MYD). More quantity of nut water was recorded during rainy season (June, July and August) than summer season (March, April and May). The total sugars, reducing sugars, total soluble sugars and ascorbic acid were found highest in dwarf cultivar (MYD) followed by GB and WCT. Dwarf (MYD) cultivar recorded higher amounts of total and reducing sugars accounting for its sweetness and lower content of sodium and potassium contents for enhancing the consumer acceptability. The mean values of quality parameters of nut water namely total soluble sugars (%), total sugars (%), reducing sugars (%), ascorbic acid (mg/100 ml), protein (mg/100 ml), sodium (ppm), and potassium (mg/100 ml) were recorded significantly maximum in March, April and May months (summer season) whereas minimum mean values were found in rainy season in all the three cultivars studied.

iii. Influence of rainy season under Kerala conditions on optimum physiological maturity of tender coconuts:

Sampling was done at ten days interval from 190 to 230 DAIE during rainy season (June to July). Tall cultivars recorded maximum nut water than dwarf cultivars. Total sugars, TSS and reducing sugars were found increasing from 190 to 220 DAIE and then declined from 220 to 230 DAIE. The optimum physiological maturity having maximum quality and consumer acceptance of tender nut water during rainy season were found at 220 DAIE. Harvesting of tender nuts can be carried out particularly during rainy season at 220 DAIE instead of 210 DAIE during summer season. The physiological maturity of tender

nut delayed by 10 days in rainy season may be due to continuous and more rains during rainy season, less sun shine hours and low light intensity.

Conclusions

Maximum amount of nut water was found at 190 DAIE and then declined from 190 to 230 DAIE. Maximum quality parameters like total soluble sugars, total sugars, reducing sugars and ascorbic acid were found increasing from 190 to 210 DAIE and then declined from 210 to 230 DAIE. Dwarf cultivars recorded higher amounts of total and reducing sugars accounting for its sweetness and lower content of sodium, potassium contents for enhancing the consumer acceptability. Optimum physiological maturity of tender nuts was found during 205 to 210 DAIE in case of dwarf cultivars whereas 210 to 215 DAIE in case of tall cultivars during summer period. Complete and uniform formation of four mm thickness of tender kernel with maximum consumer acceptance was found during optimum physiological maturity of tender nuts.

More quantity of nut water was observed in rainy season (June, July and August) whereas higher quality parameters like total soluble sugars, total sugars, reducing sugars, ascorbic acid, protein, sodium and potassium were recorded in Summer season (March, April and May). The optimum physiological maturity having maximum quality and consumer acceptance of tender nut water during rainy season in Kerala conditions were found at 220 DAIE. Harvesting of tender nuts can be carried out during rainy season particularly in Kerala at 220 DAIE instead of 210 DAIE during summer season.