

# Varieties Suitable for Tender Coconut

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## Introduction

Tender coconut is a refreshing drink and delicious food all over the coconut producing countries. In India, the annual consumption of tender coconuts is estimated at 500 million. The tender coconuts are valuable for sweet water, which is a healthy drink and its gelatinous kernel is a tasty food. Tender coconut water has a number of medicinal properties and it is an essential component in many ayurvedic preparations.

## Uses of Tender Coconut Water

The use of tender nut water is recommended in cases of gastro enteritis and as a useful substitute to saline glucose in intravenous infusion. It is also prescribed in serious cases of

diarrhoea and vomiting against dehydration of body tissues. It increases the blood circulation in the kidneys and causes profuse diuresis. Taking plenty of tender nut water is recommended for the patients suffering from measles, mumps, chickenpox etc.

Tender nut water is also reported to contain substances capable of inducing rapid proliferation of plant tissues (Vano Verbeck *et al.*, 1942, Venderbelt, 1945). It has also been used as bacterial and plant tissue culture medium.

## Chemical Constituents

At tendernut stage *ie.*, at 7-month old stage, a large coconut may contain about 600 ml water, with 30g sugar and 2g potassium. Varietal differences in the yield of water as well as sweetness are found. Some coconut cultivars are known to produce tender coconuts yielding up to 1.5 liters of sweet water (Thampan, 1996). The composition of tendernut water is influenced by the conditions under which the palms are growing and mineral nutrition they are receiving.

During maturation of the nuts, the volume of water decreases considerably, accompanied by changes in the chemical composition and palatability. Several studies have been made to estimate the chemical composition of nut water in relation to maturity (Nathaniel, 1952., Kamala Devi and Velayuthan, 1978., Jayalekshmi *et al.*; 1988 and Chikkasubbanna *et al.*; 1990). Tuleck *et al.*, (1961) compared the free amino acids and organic acid contents of mature and tender coconut water.



Chowghat Green Dwarf

The pleasant taste of tendernut water is attributed mainly to the sugars and mineral matter (Chikkasubbanna *et al.*, 1990). The minor constituents, such as, fats, free amino acids, nucleic acids, organic acids and dissolved gases contribute overall flavour and mouth feel (Jayalekshmy *et al.*; 1988)

## Studies Carried Out at CPCRI, Kasaragod

Central Plantation Crops Research Institute (CPCRI), Kasaragod is maintaining 132 accessions of coconut in the field genebank, which comprises of 86 exotic and 46 indigenous types. The accessions are being evaluated for yield of nuts and yield of copra in addition, to the yield of oil. Simultaneously, the accessions are being screened for tendernut water and tolerance/resistance to drought and pests / diseases.



Chowghat Orange Dwarf

**Table: Biochemical constituents of tendernut water and nut yield in 16 coconut cultivars in comparison with the released cultivar Chowghat Orange Dwarf. (Mean value)**

| Sl. Cultivar No.        | Volume of water (ml) | Total sugars (g/100 ml) | Reducing sugars (g/100 ml) | Free amino acids (mg/100ml) | K (ppm) | Na (ppm) | Organo leptic taste rank | Nut yield per palm per year |
|-------------------------|----------------------|-------------------------|----------------------------|-----------------------------|---------|----------|--------------------------|-----------------------------|
| <b>I Talls</b>          |                      |                         |                            |                             |         |          |                          |                             |
| 1. Benaulim             | 250<br>(210-285)*    | 5.7                     | 2.3                        | 1.8                         | 2437    | 30       | good                     | 150                         |
| 2. Fiji Tall            | 330<br>(235-480)     | 6.0                     | 3.0                        | 2.0                         | 2212    | 26       | good                     | 67                          |
| 3. Cochin China         | 448<br>(410-520)     | 5.5                     | 2.6                        | 1.1                         | 2150    | 22       | good                     | 51                          |
| 4. Guam III             | 326<br>(200-490)     | 6.0                     | 3.7                        | 2.0                         | 2434    | 34       | good                     | 96                          |
| 5. Karkar               | 795<br>(640-930)     | 6.9                     | 5.4                        | 0.9                         | 2880    | 24       | good                     | 51                          |
| 6. Blanchissues         | 520<br>(485-540)     | 6.8                     | 4.2                        | 2.6                         | 3700    | 31       | good                     | 65                          |
| 7. FMS                  | 600<br>(525-650)     | 6.0                     | 2.7                        | 2.0                         | 2400    | 27       | good                     | 59                          |
| 8. West African Tall    | 325<br>(280-368)     | 6.0                     | 5.5                        | 1.7                         | 3600    | 20       | good                     | 67                          |
| 9. Tiptur Tall          | 265<br>(230-300)     | 5.0                     | 3.5                        | 2.8                         | 3200    | 40       | good                     | 86                          |
| 10. Sakhigopal          | 260<br>(220-330)     | 6.8                     | 3.4                        | 1.3                         | 2216    | 38       | good                     | 85                          |
| <b>II Dwarfs</b>        |                      |                         |                            |                             |         |          |                          |                             |
| 1. Malayan Orange Dwarf | 330<br>(260-510)     | 6.7                     | 4.1                        | 1.8                         | 2142    | 35       | good                     | 62                          |
| 2. Cameroon Red Dwarf   | 337<br>(310-470)     | 7.0                     | 3.7                        | 2.1                         | 1975    | 27       | good                     | 80                          |
| 3. Surinam Dwarf        | 245<br>(210-260)     | 7.0                     | 6.6                        | 1.9                         | 3000    | 22       | good                     | 48                          |
| 4. Gangabondam          | 305<br>(215-390)     | 5.1                     | 3.8                        | 1.5                         | 1931    | 24       | good                     | 49                          |
| 5. Chowghat Green Dwarf | 160<br>(135-180)     | 5.9                     | 4.0                        | 0.8                         | 2900    | 20       | good                     | 75                          |
| 6. King Coconut         | 358<br>(300-440)     | 6.2                     | 2.7                        | 2.5                         | 2000    | 27       | good                     | 52                          |
| Chowghat Orange Dwarf   | 350<br>(260-460)     | 7.1                     | 4.7                        | 1.8                         | 2003    | 20       | good                     | 63                          |

\* values in parenthesis denote range.



Gangabondam

### Methods of Analysis of Tender Coconut Water

Seven-month old nuts at the rate of one nut per palm and four nuts per cultivar were used for organoleptic as well as biochemical analysis.

The total volume of nut water was recorded. Total sugars were estimated by the phenol-sulfuric acid methods of Dubois *et al.*, (1951). Reducing sugars were estimated by the copper reagent - ammonium molybdate methods. (Somogyi, 1952) and free amino acids by the method developed by Yipinlee and Tunekazu Takahashi (1966). Sodium and potassium were estimated using a flame photometer (Jackson, 1973).

The organoleptic evaluation was made with the help of seven independent tasters. The nut water sample of each cultivar was replicated 10 times and randomly placed and the total score for each cultivar was worked out (Dhamodaran *et al.*, 1991).

Based on the organoleptic test as well as biochemical test in 46 cultivars, one indigenous dwarf cultivar *viz.*, Chowghat Orange

Dwarf was recommended for release by CPCRI in 1991, for tender coconut purpose. (Dhamodaran *et al.*, 1993).

Subsequently, some more cultivars were screened for tendernut water. The biochemical parameters of those cultivars which have been ranked as 'good' based on the organoleptic test, are given in the following table, along with the released cultivar 'Chowghat Orange Dwarf'.

The volume of water was maximum (795 ml/nut) in cultivar Karkar. The total sugar content ranged from 5.0g/100 ml in cultivar Tiptur Tall to 7.0g/100ml each in cultivar Cameroon Red Dwarf and Surinam Dwarf. The free amino acid content was maximum (28 mg/100ml) in Tiptur Tall. The sodium content varied from 20 ppm each in West African Tall and Chowghat Green Dwarf to 40 ppm in cultivar Tiptur Tall. The potassium content was maximum (3700 ppm) in Blanchissues and minimum (1931 ppm) in Gangabondam.

### Conclusion

In addition to Chowghat Orange Dwarf, other dwarf cultivars like



Cameroon Red Dwarf

Chowghat Green Dwarf, Gangabondam, Malayan Orange Dwarf, Cameroon Red Dwarf and King Coconut are suitable for tender coconuts. The tall cultivars listed in the table also can be used for tender nut water.

### References

Chikkasubbanna, V., Jayaprasad, K.V., Subiah Thilak and Pooncha, N.M. 1990. Effect of maturity on the chemical composition of tender coconut (*Cocos nucifera* L. var. Arsikere Tall) water. *Indian Cocon. J.* 20 (12) : 10-13.

Dhamodaran, S., Ratnambal, M.J., Chempakam, B., Pillai, R.V. and Virakatamath, B.C. 1993. Evaluation of tendernut water in coconut cultivars In: *Advances in Coconut Research and Development* (M.K. Nair, H.H. Khan, P. Gopalasundaram and E.V.V. Bhaskara Rao Eds.). Oxford & IBH Pub. Co., New Delhi. pp. 124-128.

Dubios, M.K., Giller, H. Hamilton, J.K., Robers, D.A. and Smith. 1951. A colorimetric method for determination of sugars. *Nature* 168: 167-174.



Malayan Orange Dwarf



Jackson, M.L. 1973. Soil Chemical Analysis. Prentice Hall, New Delhi 478 p.

Jayalekshmy, A., Arumughan, C., Narayanan, C.S. and Mathew, A.G. 1988. Changes in the chemical composition of coconut water during maturation. *Oleagineux*. 43 (11) : 409-411.

Kamala Devi, C.B. and Velayutham, M. 1978. Changes in the chemical composition of nut water and kernel during development of coconut. In: *Proc. Placosym*: E.V. Nelli (Ed. In Chief). Indian Society for Plant. Crops, Kerala, pp. 340-346.

Nathaniel, W.R.N. 1952. The sugars of coconut water. *Ceylon Cocon. Quart.* 3 : 193-199.

Somogyi, M. 1952. Notes on sugar estimation. *J. Biol. Chemistry*, 195: 19-23.

Thampan, P.K. 1996. *Coconut for prosperity*. Peekay Tree Crops Development Foundation, Cochin, Kerala, India. 247 p.

Tulecke, W., Weinstein, L.H., Rutner, A., and Laungot. H.I. Jr. 1961. The biochemical composition of coconut water as related to its use in



King Coconut in a selling centre in Sri Lanka

plant tissue culture. *Contrib. Boyce Thompson Inst.*, 21:114.

Vanderbelt, T.M. 1945. Nutritive value of coconut. *Nature*, Lond. 156: 176.

Van Over Beck, J., Conklin, M.E. and Belakeslee. 1942. Cultivation in

*vitro* of small datura embryos. *Am.J.Bot.* 29:472.

Yapinlee and Tunekazu Thahahashi. 1966. An improved calorimetric determination of amino acids with the use of ninhydrin. *Anal. Biochem.*, 14:71-77.

## Buko\*pie - Laguna's best delicacy

The mysterious Mount Makiling is the one of Laguna's flora and fauna, a delight to many mountain climbers and nature trippers. Even the mere sight of the dormant volcano is spectacular. But who could miss the tall coconut trees lining the highways of Laguna. The leaves swaying with the wind, like Polynesian dancers dancing to drum beats.

Coconut tree is considered the 'universal tree of life'. It is our food, milk, juice, wine and alcohol. It is useful on women's hair. Coconut oil is a good substitute for the expensive hot oil

treatment. The shells are used as ornaments, combs and clips. The tree is also the source of soft and hard drink like the tuba and lambanog. The roots and fibers provide herbal relief. However, the fruit itself provides the ingredient for cooking Laguna's best delicacy - 'buko pie'.

Call it a buko pie country. But buko pie stalls have sprung one after another along the national highway going to Calamba and Los Banos. Each stall has an unending queue of people wanting to savor the sweet and fresh pie. One of these stalls is owned by Normita Limjoco Lariza who

started the business as a hobby way back in 1975. She proudly says that her customers describe her buko pie as sweet but delicious. She claims that she formulated all her recipes and the ingredients she uses are all fresh. She does not compromise quality even if it would mean buying imported ingredients.

A word of advice though, refrain yourself from eating the whole box. You might have stomach pains. (By Maan P. Iustre, excerpted from Manila Bulletin, 11 December 1998). (\*Buko is a Tagalong term meaning young coconut. -Ed)

The Cocomani