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Evaluation of Coconut Hybrids for Tender nut

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An experiment to evaluate the coconut hybrids for tender nut was conducted at Coconut Research Station, Aliyar nagar during 2017-18. Seven cross combinations along with eight parents were studied. The nuts were harvested at tender nut stage and the quantitative traits like nut weight, volume of nut water and qualitative traits *viz*., pH, TSS, Total sugars, reducing sugar, non-reducing sugar, sodium and potassium were recorded. Among the hybrids COD x WCT significantly differed from other hybrids for volume of tender nut water, sodium and potassium content which is mostly preferred for the tender nut quality.

Key words: Hybrids, Tender nut, Quantitative traits, Qualitative traits.

Coconut (*Cocos nucifera* L.) is a perennial palm widely distributed in the tropical region of the world. Tender coconut is emerging as world's number one health drink. Demand for tender nut is increasing globally. Tender coconut water is very popular as a refreshing natural drink in all the coconut producing countries. It has a vast commercial potential. The tender nut supplies coconut water a popular thirst quencher of health and hygienic value which is a multi crore business all over the India. It is a natural, nutritious, medicinal, mineral drink with well acceptable flavor and taste and consumed by all age groups (Rethinam and Nandakumar, 2001). With the recent shift from synthetic to natural soft drinks, tender nut water is gaining popularity in traditional and export markets. The quality and acceptability of the final product depend upon the initial quality of the tender nut water but the initial quality of the water is governed by the age of the nuts, variety and agro-climatic conditions where it is grown. Identification of suitable genotypes with superior quality and quantity will be a favorable footstep for farmers or industries preference from the commercial point of view.

Improving the genetic potential and increasing the productivity for better returns will be an important plan for future strategies in coconut farming. The discovery of hybrid vigour in coconut by Patel (1937) in a cross between WCT and CGD made in 1932 was a significant landmark in the history of crop improvement in coconut. Hybrids are also reported to be superior in tender nut water traits compared to its parents Assa *et al.* (2013). So we are in need of identifying hybrids exclusively for tender nut purpose. Hence, this study was taken up to identify the superior coconut hybrids for tender nut purpose.

Material and Methods

The experiment was carried out in Coconut Research Station, Aliyar nagar which is located in the foot hills of Western Ghats at the geographic co-ordinates of 10º N latitude and 77ºE longitude, 20 km south of Pollachi at an elevation of 260m above MSL with an undulating topography. The experimental material consist of seven cross combinations *viz.,* ALR1×MGD, MGD×ALR1, COD×ALR1, COD×WCT, KTD×ALR1, ADOT×ECT and ECT×LCT along with their parents. The hybrids and their parents were planted at a spacing of 7.5 x 7.5m in randomized block design with three replications. Two palms in each genotype per replication were maintained. The quantitative parameters like whole nut weight(kg), volume of tender nut water (ml) and the qualitative parameters *viz.,* TSS (°Brix), pH, Total sugar (g/100ml), reducing sugar (g/100ml), non-reducing sugar (g/100ml), Sodium (ppm) and Potassium (ppm) content were recorded.

The pH was recorded using digital pH meter. The total sugar was estimated by anthrone method (Hegde and Hofeiter, 1962) and expressed in gram. The method of Somogyi (1952) was followed to estimate the reducing sugar content. The sodium and potassium were determined by Flame Photometer using NaCl and KCl.

Result and Discussion

Tender nut characters of whole nut weight and volume of tender nut water

The nut weight is a very important indicator for economic yield and plays an important role for human selection for superior types. Among the hybrids evaluated, the highest whole nut weight was observed in hybrid ECT×LCT (3.94 kg) followed by MGD×ALR1 (3.46 kg). Increase in nut weight is due to increase in volume of water during 6th month, whereas it reduced towards maturity as reported by Apshara et al. (2007). The quality and acceptability of the final product depend upon the initial quality of the tender nut water but the initial quality of the water is governed by the age of the nuts, variety, agro-climatic conditions and horticultural practices. In hybrids, the volume of tender nut water was highest in COD×WCT (603.33

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ml) followed by MGD×ALR1 (571.82 ml) which was in accordance to the findings of Ramanandam *et al.* (2017), that hybrids D×T recorded the highest tender nut water.

Table 1. Mean performance of Coconut hybrids and parents of tender nut characters and quality characters of TSS and pH

Hybrids/ Parents	Whole nut weight (kg)	Volume of tender water (ml)	TSS (°Brix)	pH
ALR1×MGD	2.26	315.38	7.59	5.09
MGD×ALR1	3.46	571.82	5.80	5.26
COD×ALR1	2.52	466.95	6.66	4.80
COD×WCT	2.76	603.33	5.88	4.78
KTD×ALR1	2.63	420.43	5.37	4.95
ADOT×ECT	2.65	349.67	6.04	5.23
ECT×LCT	3.94	446.93	6.02	4.76
ALR1	1.80	376.42	7.15	4.85
MGD	2.28	506.43	5.53	4.69
COD	1.45	318.38	4.46	4.95
WCT	1.88	424.00	5.39	4.80
KTD	1.90	436.85	8.05	5.13
ADOT	1.99	314.17	7.97	5.24
ECT	2.97	531.67	7.59	4.93
LCT	1.80	278.33	8.20	4.85
G. Mean	2.42	424.05	6.51	4.95
S.E.	0.04	6.24	0.11	0.07
CD (5%)	0.09	12.78	0.22	0.14

Quality characters of TSS and pH

The quality traits of tender nut water depend on TSS, pH, Sugars and mineral content. The pleasant taste of nut water is mainly attributed to the sugar and mineral components present (Chikkasubbanna *et al.*, 1990) and changes in the parameters may occur with the cultivar/ variety. TSS (°Brix) was given more scores by the participants and hence TSS could be a useful trait in identifying the individual palms. Slowly increasing pH values towards maturity indicated the gradual loss of acidity and added sugariness in water. In hybrids, the TSS and pH and was recorded higher in ALR1×MGD (7.59°Brix) and MGD×ALR1 (5.26) which reveals that Malayan dwarf is preferred over the local dwarf as a parental palm as reported by Henry Louis (2002) since distant hybrids perform better.

Total sugar, reducing sugar and non-reducing sugar

Total sugars are the main biochemical constituents of nut water responsible for the sweet taste. In the present study, total sugar and non-reducing sugar was highest in ADOT×ECT (4.15 g/100ml and 4.11 g/100ml) and low quantity of total sugar and non-reducing sugar content was recorded in ECT×LCT (0.95 g/100ml) and (0.91 g/100ml). Rethinam and Nandakumar, (2001) have observed that the quality of total sugar vary from variety to variety and from place to place which was confirmed in this study. The highest quantity of reducing sugar was recorded in hybrid COD×ALR1 (0.05 g/100ml) and lowest quantity of reducing sugar content was recorded in ALR1×MGD (0.01 g/100ml).

Table 2. Mean performance of Coconut hybrids and parents for quality characters of Sugars

Hybrids/ Parents	Total Sugar content (g/100ml)	Reducing Sugar (g/100ml)	Non reducing Sugar (g/100ml)
ALR1×MGD	1.88	0.01	1.87
MGD×ALR1	2.51	0.04	2.47
COD×ALR1	2.31	0.05	2.26
COD×WCT	2.54	0.03	2.51
KTD×ALR1	1.94	0.02	1.92
ADOT×ECT	4.15	0.04	4.11
ECT×LCT	0.95	0.04	0.91
ALR1	3.15	0.04	3.11
MGD	4.14	0.04	4.09
COD	1.78	0.03	1.75
WCT	1.92	0.03	1.89
KTD	1.32	0.05	1.26
ADOT	1.00	0.06	0.94
ECT	1.81	0.12	1.69
LCT	1.18	0.04	1.14
G. Mean	2.17	0.043	2.13
S.E.	0.04	0.002	0.04
CD (5%)	0.09	0.003	0.09

Sodium and Potassium content

The highest sodium content was recorded in the WCT (82.50 ppm) and the lowest content of sodium was recorded in COD×WCT (17.11 ppm).

Table 3. Mean performance of Coconut hybrids and parents for quality characters of Sodium and Potassium content

Hybrids / Parents	Sodium content (ppm)	Potassium content (ppm)
ALR1×MGD	49.73	2017.59
MGD×ALR1	54.94	2210.65
COD×ALR1	47.55	2155.40
COD×WCT	17.11	1435.60
KTD×ALR1	58.27	1815.48
ADOT×ECT	56.51	1850.22
ECT×LCT	64.78	1837.44
ALR1	35.51	2707.09
MGD	62.68	1452.46
COD	11.31	2134.38
WCT	82.50	2019.60
KTD	23.82	1932.27
ADOT	49.11	2934.92
ECT	33.14	2398.05
LCT	26.92	2142.63
G. Mean	44.93	2069.59
S.E.	0.83	36.91
CD (5%)	1.71	75.61

The highest potassium content was observed in MGD×ALR1 (2210.65 ppm) followed by COD×ALR1

(2155.40 ppm) and the lowest content of potassium was observed in COD×WCT (1435.60 ppm). The proportion of sodium and potassium contents in tender nut water was important for its effect on kidney and urinary tract functions. Generally less to optimal levels of sodium and potassium contents were preferred for the best tender nuts. In this study COD×WCT recorded minimum sodium and potassium content as reported by Apshara et al. (2007).

Conclusion

For tender nut purpose, the volume of tender nut water and the level of sodium and potassium play an important role in selection. Considering the above facts, COD×WCT recorded the highest volume of water, with lowest sodium and potassium content. Hence, it is concluded that dwarf x tall hybrid (COD×WCT) is comparatively suitable for tender nut purpose.

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