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Evaluation of Coconut Genotypes for Coconut Inflorescence Sap Yield

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Abstract: A study was carried out with nine coconut genotypes namely Gangapani Tall, Gonthebili Tall, Nigerian Tall, Hazari Tall, Jamaica Tall, Navasi Tall, NiuQuewen Tall, West Coast Tall and East Coast Tall to evaluate the coconut genotypes suitable for production of coconut inflorescence sap (neera). The results revealed that the genotype Nigerian Tall had the highest average inflorescence sap yield of 2098.74 ml per inflorescence which was significantly higher than the other genotypes. Days taken to start the sap flow varied from 16.1 days (Nigerian Tall) to 23.5 days (East Coast Tall). The sap production duration of a spathe varied from 34 days (East Coast Tall) to 56 days (Nigerian Tall). That duration depended on the length of spathes. Length of the inflorescence was maximum in Gonthebili Tall (86.5 cm) and median circumference of the inflorescence was maximum in Nigerian Tall (24.7 cm). Results revealed that sap yield is related to the duration of sap production, length and median circumference of the inflorescence. Among the genotypes evaluated Nigerian Tall yielded highest quantity of sap hence the genotype can be effectively utilized for coconut inflorescence sap production.

INTRODUCTION

Coconut inflorescence sap is extracted from unopened inflorescence (spathe) of the coconut. This sap is commonly referred as neera and the process of stimulating the spathe to yield sap is referred as tapping. Neera is a sweet, honey coloured nutritionally rich healthy drink. Apart from that, neera is the raw material for production of value added

products namely coconut sugar, honey and syrup. It is rich in sugars, minerals, proteins, vitamins and amino acids. More significantly it has low Glycemic Index (GI is 35). There is high demand for low GI sugar foods in global level. Hence neera and its value added products have great scope in national and international market. Since, frequent fluctuation in the price of copra, neera is the viable strategy to

revive the coconut sector. The yield of neera highly varied with several factors such as variety, season, growing conditions and skill of the tapper. Among these, coconut genotype plays an important role in neera production. However studies on coconut varieties suitable for neera production are scanty. Hence a detailed study regarding identification of genotypes for commercial extraction of neera is required. The present study was undertaken to evaluate different genotypes maintained in ICAR-Central Plantation Crops research institute for coconut inflorescence sap yield.

MATERIALS AND METHODS

The study was conducted at ICAR-CPCRI, Kasaragod, Kerala during 2017-18. Coconut genotypes namely, Jamaica Tall, Hazari Tall, Navasi Tall, Gonthebili Tall, Gangapani Tall, Nigerian Tall, West Coast Tall, East Coast Tall and NiuQuewen Tall were selected from the germplasm maintained at ICAR-CPCRI, Kasaragod, Kerala. All the genotypes were planted during 1992. Three trees from each genotype were selected based on the uniform morphological characters for the study. Unopened 6-8 weeks old inflorescence was selected based on the indication of swelling of the base of the spathe due to female flower production and treated (tying the spathe, massaging and pairing a slice) to flow the sap for 2-3 weeks. Sap was collected during morning and evening and measured the quantity till it reach the stump of 10-15cm. Observation on total sap yield per inflorescence, average sap yield, length of the inflorescence, median circumference of the inflorescence, days taken to start the sap flow and duration of sap flow per inflorescence were recorded. The data obtained were analyzed statistically and difference was tested at 5 % level.

RESULT AND DISCUSSION

The coconut genotypes significantly varied with respect to yield of coconut inflorescence sap

(Fig. 1). The genotype Nigerian Tall recorded the highest total sap yield of 73753.33 ml per inflorescence which was significantly higher than other genotypes. Lowest sap yield of 4318.5 ml per inflorescence was recorded by East Coast Tall. Maximum sap production was recorded during morning in all the genotypes than the sap collected during evening. Highest average sap yield was recorded by Nigerian Tall (2098.74 ml per day) followed by Gangapani Tall (1410.47 ml per day) and Gonthebili Tall (1303.33 ml per day). These differences may be attributed to the genetic potentials of the genotypes. Similar findings was reported by Samsudeen *et al.* (2013), Hebbar *et al.* (2015), Konan *et al.* (2013) and Joseph *et al.* (2018).

The duration of sap production differed significantly in all the studied cultivar. Duration of sap production varied from 34 to 56 days. Spathes of Nigerian Tall produced sap for the maximum duration of 56 days than other genotypes. Least duration of sap production was recorded in East Coast Tall (34 days) (Fig. 2). Variation in duration of sap production with respect to different varieties was reported by Konan *et al.* (2013) and he reported that duration of sap flow varied because of variation in length of inflorescence of a particular coconut variety. In addition, length of the inflorescence is a characteristic feature of variety. Longer the inflorescence is the longer time for flow of sap and hence more duration of sap production. Cortázar *et al.* (2010) who also reported that the duration of sap flow varied with differences in coconut cultivar and agro-climatic conditions.

Days taken to start the flow varied with genotypes and it varied from 16.1 to 23.5 days. Among the genotypes Nigerian Tall started to flow the sap from 16.1 days onwards whereas East Coast Tall took 23.5 days to start the flow. Generally tapping of sap includes four phases. During first phase activities such as selection of inflorescence at correct stage, tying along its length to prevent the split

opening of the spathe, beating or massaging the spathe, removing a thin slice at the tip of the spathe were followed. Second phase starts with the flow of the sap and initially spathe did not produce a high volume of sap. The sap volume may be less than 10 ml and it increase gradually. The Third stage was

characterized by a maximal and steady daily production and during fourth phase the sap volume again started to decrease and stopped eventually. Hence the days for each phase differ with genotypes. Similar results were reported by Konan *et al.*, (2013).

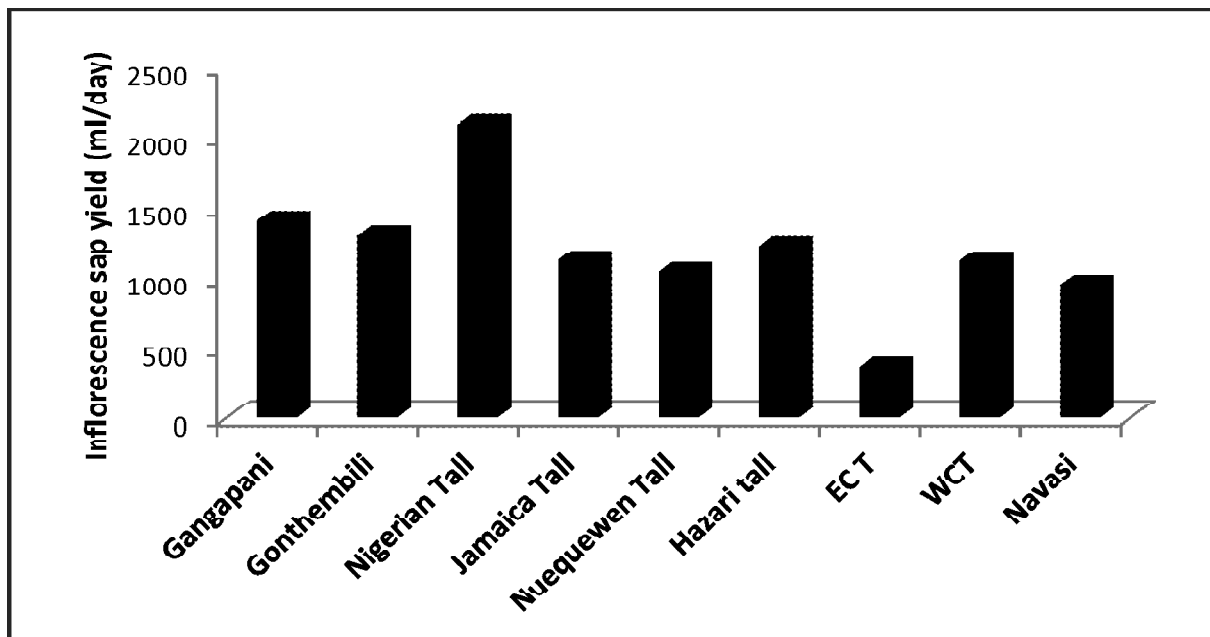


Figure 1: Average inflorescence sap yield in different coconut genotypes

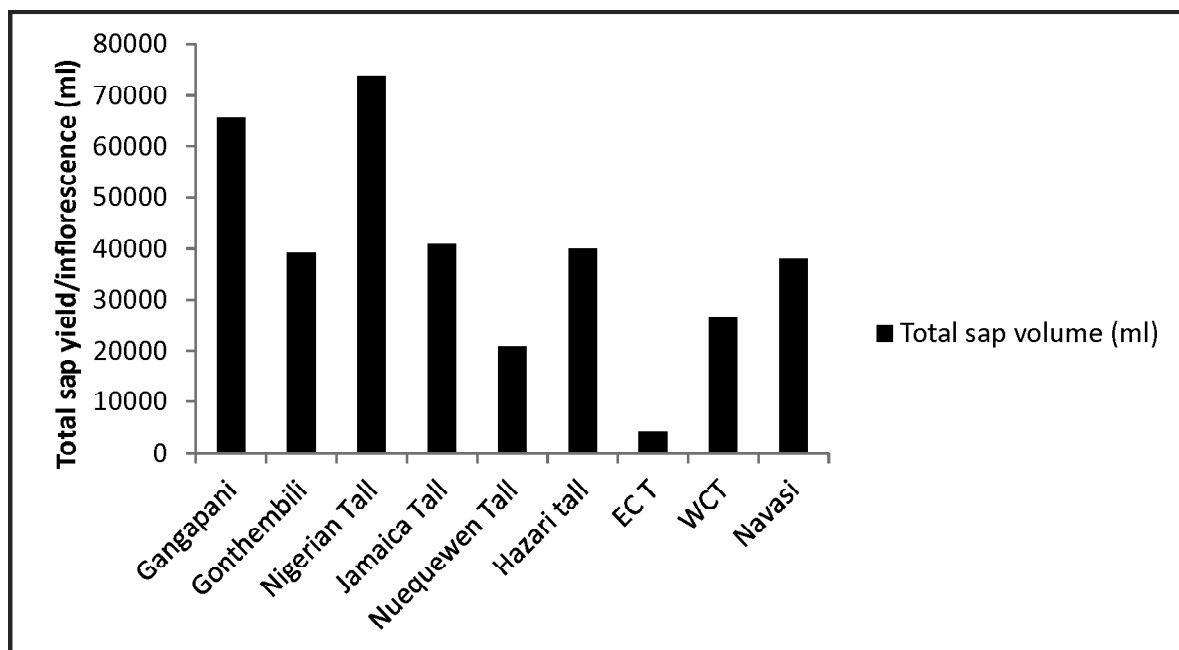


Figure 2: Total inflorescence sap yield per inflorescence in different coconut genotypes

The length of the inflorescence varied from 72 cm to 86.5 cm. Highest inflorescence length of 86.5 cm was recorded in Gonthembili Tall and it was lowest in East Coast Tall. Median circumference of the inflorescence varied from 18 to 24.7 cm.

Highest median circumference was observed in Nigerian Tall (24.7 cm) and lowest was observed in East Coast Tall. These physical parameters were corresponding well with the sap volume of the genotype. Ranasinghe and Silva (2007) reported some

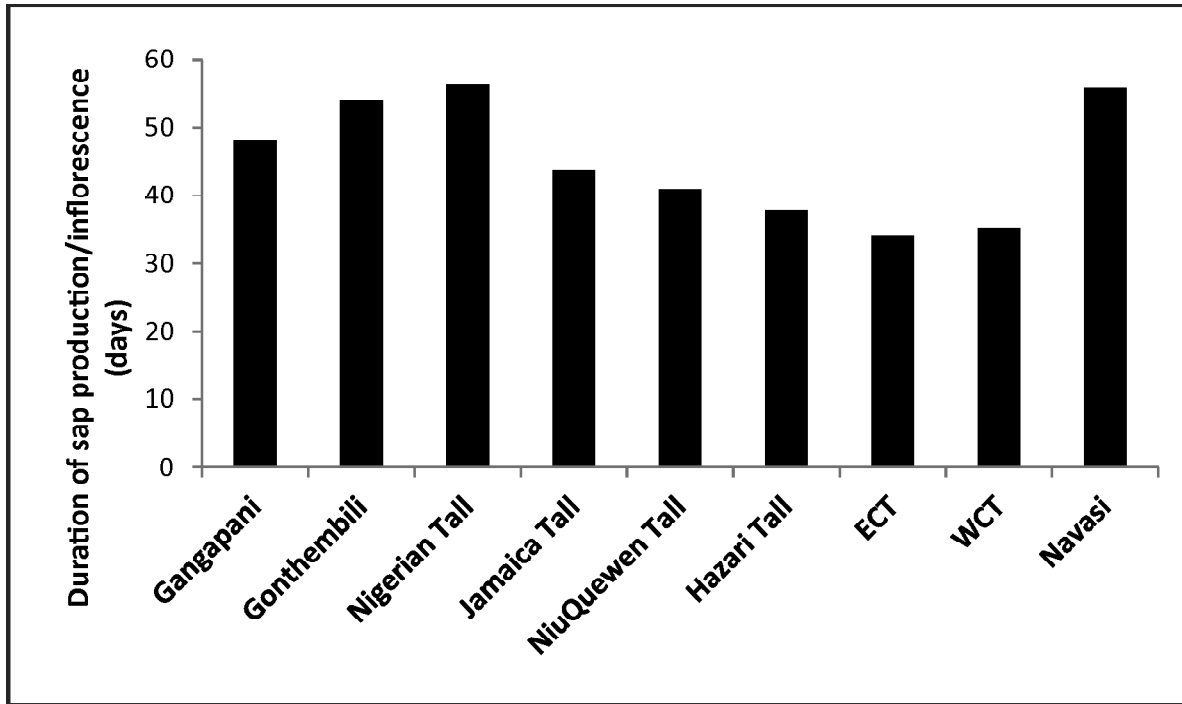


Figure 3: Duration of sap production in different coconut genotypes

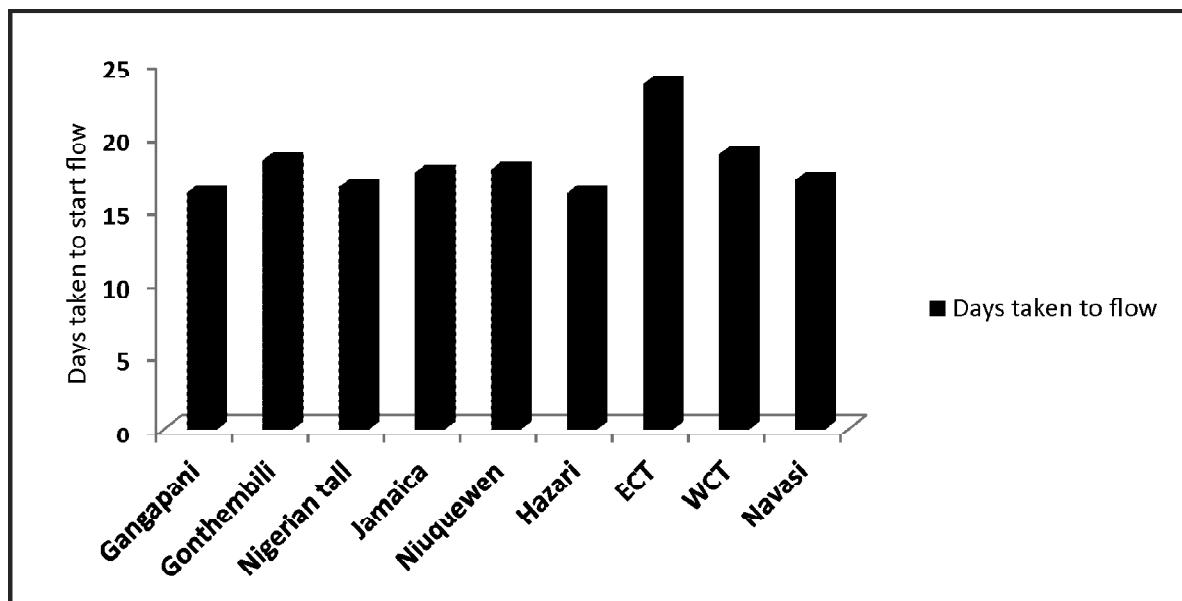


Figure 4: Days taken to flow sap in different coconut genotypes

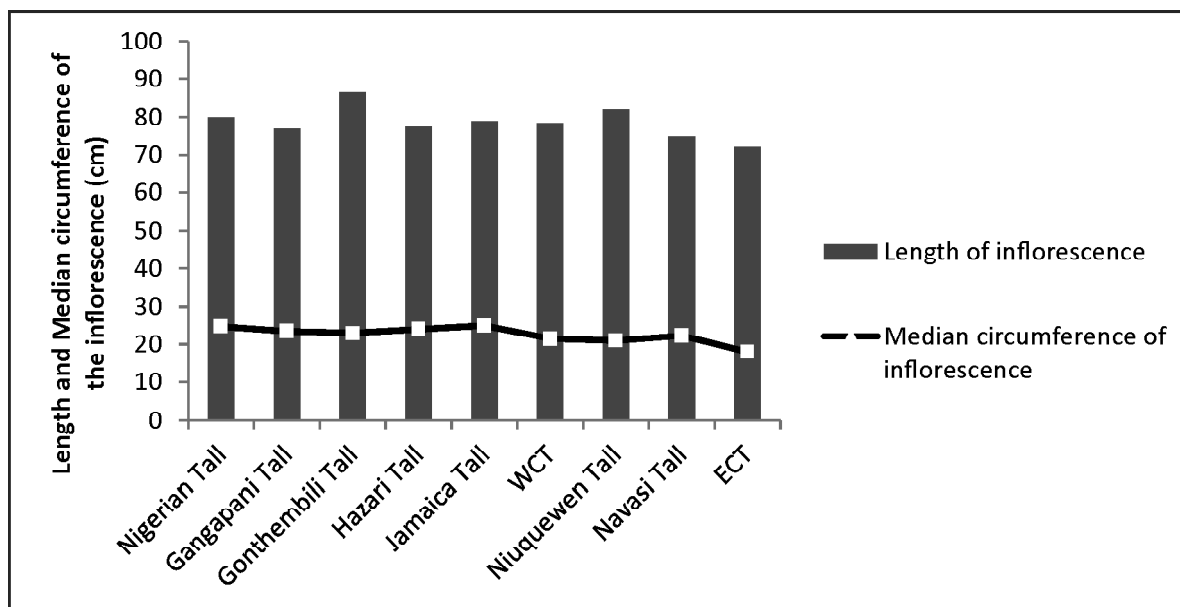


Figure 5: Length and median circumference of inflorescence of different coconut genotypes

visual criteria to select the palms for neera tapping including length of the inflorescence as important criteria. Konan *et al.*, (2013) studied neera production parameters in two varieties and hybrids and reported differences in the length and median circumference of the inflorescence among the varieties/hybrids. He also reported there is a positive correlation between the volume of sap production and the length and median circumference of the inflorescence.

The study has revealed that there is difference among different coconut genotypes in inflorescence sap production. Among the evaluated genotypes, Nigerian Tall recorded higher quantity of sap, longer duration of sap flow, early sap flow and highest median circumference of the inflorescence. Hence this genotype is suitable for tapping for sap production.

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