

Original Research Article

<https://doi.org/10.20546/ijcmas.2018.702.318>

## Performance of Indigenous and Exotic Coconut Germplasm for Yield and Nut Quality under Aliyarnagar Condition

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### ABSTRACT

Investigation was carried out at Coconut Research Station, Tamil Nadu Agricultural University, Aliyarnagar, during 2015-2017 to study the performance of indigenous and exotic coconut genotypes for yield and nut quality. Wide variations on vegetative parameters were observed within the genotypes. Among the nineteen genotypes the maximum vegetative characters viz., palm height (15.70 m) in Java Tall, trunk girth (1.26 m each) in FMS and Andaman Gaint, number of functional leaves (38.25) in Ceylon tall, petiole length and length of leaflet bearing portion (1.53 m and 5.84 m) in Nadora Tall and number of inflorescence per palm per year (14.16) were recorded in Seychelles Tall. The maximum number of bunches per palm per year and nut yield per palm per year were recorded by Seychelles Tall (13.36 and 211.50, respectively) compared to minimum values recorded by Tiptur Tall (10.13 and 67.25). The maximum nut characters namely whole nut weight (1999.50 g), dehusked nut weight (1323.00 g), kernel weight (510.00 g) and copra content (390.50 g) were recorded by Andaman Giant. However, the maximum nut husk weight was recorded by San Roman (677.50 g) compared to lowest recorded by Arasampatti Tall (187.00 g). Though, the number of nuts was maximum in genotype Seychelles Tall but considering to the quantitative and qualitative characters it revealed that genotype Andaman Giant performed better than other genotypes.

#### Keywords

Coconut  
germplasm, Nut  
yield, Nut quality,  
Crop improvement

#### Article Info

Accepted:  
24 January 2018  
Available Online:  
10 February 2018

### Introduction

*Cocos nucifera* L., Arecaceae, (2n=32), is the most ubiquitous plant in lowland tropics of the World. It is grown as a plantation crop over large areas and in homesteads as well. It provides food, drink, beverage, medicine, fibre and a variety of raw materials for production of an array of products of commercial importance. India is the third largest coconut producing country in the world, contributing for 31.02 per cent of the

world production. Indonesia, Philippines and India are the leading coconut growing countries having 75.87 per cent of the total area under coconut, contributing 75.48 per cent of the coconut production of the world (APCC, 2015). India occupies a prominent position in the world map with an annual production of 21,665.00 million nuts from an area of 2.14 Mha (APCC, 2015). It is cultivated in 16 states and in 4 union territories of the country. The major coconut growing states in the country are Kerala,

Tamil Nadu, Karnataka and Andhra Pradesh which together account for more than 90.11 percent of the coconut production. The yield of coconut, being a complex character, is controlled by a number of components and their interaction. Identification of suitable genotypes with superior quality as consumer preference and more number of nuts per palm as farmer's preference will be a favourable step. Hence, the study was taken up to evaluate the performance of indigenous and exotic germplasm of coconut for yield and nut quality under Aliyarnagar condition.

### **Materials and Methods**

An experiment was carried out at Coconut Research Station, Tamil Nadu Agricultural University, Aliyarnagar, during 2015 to 2017. The 19 indigenous and exotic genotypes were taken for the study. Among 19 genotypes six genotypes were indigenous and 13 genotypes were exotic origin. The list of genotypes and origin were given in Table 1.

The experiment was laid out in a randomized block design with two replications. Three set of genotypes were taken for the study which had been planted at a distance of 7.5 x 7.5 m during 1988, 1990 and 1994 under All India Coordinated Research Project (AICRPs). The age of the trees ranged between 23 and 29 years. Recommended package of practices were followed for all the genotypes (Nampoothiri *et al.*, 2000). The observations on vegetative parameters and nut characters were recorded by drawing random sample of three nuts (12 months maturity) per germplasm in each replication.

The yield of nuts per palm was recorded periodically at each harvest from September to August and pooled to get nut yield per palm per year. Data was subjected to statistical analysis using analysis of variance (Gomez and Gomez, 1984).

### **Results and Discussion**

In the present investigation, significant differences were observed on palm height, palm girth, number of functional leaves, petiole length, length of leaflet bearing portion and number of inflorescence per palm among the genotypes (Table 2). The maximum palm height (15.70 m) was recorded by Java Tall followed by FMS (15.44 m) compared minimum palm height recorded by Guam (7.59 m). Significantly highest trunk girth was recorded by FMS and Andaman Giant (1.26 m each) which was on par with Zanzibar Tall (1.16 m) compared to lowest recorded by BSI (0.91 m).

Maximum number of functional leaves per palm per year was recorded by Ceylon Tall (38.25) which was on par with genotypes Zanzibar Tall, San Roman and East Coast Tall (38.00 each) compared to minimum values recorded by Tiptur Tall (29.25). The longest petiole length and length of leaflet bearing portion were recorded by Nadora Tall (1.53 and 5.84 m, respectively). However, the maximum no. of inflorescence per palm per year was recorded by Seychelles Tall (14.16) which was on par with Laccadive Ordinary (13.80) compared to minimum values recorded by Tiptur Tall (11.56). Perera and Ekanayake (2008) studied the traits of leaf, inflorescence, and fruit diversity of Sri Lankan indigenous coconut varieties using multivariate discriminating methods. This study also reported a high diversity for fruit characters and vegetative characters among cultivars. The length of leaf and the number of leaves are important character, since it decides the ability of the leaf to support the bunches in its axils and also increase the photosynthetic efficiency. Similar results were also reported by Jerard (2002); Jayalakhmi and Sree Rangasamy (2002); Basavaraju *et al.*, (2011); Suchitra (2014) and Ramanandam *et al.*, (2017).

**Table.1** List of coconut genotypes and their origin and characters

| S. No | Genotype                     | Origin            | Year of planting | Characters  |
|-------|------------------------------|-------------------|------------------|---|
| 1     | Arasampatti Tall (Check)     | India             | 1988             | Superior yielder, local cultivar of west coast region |
| 2     | Zanziber Tall                | Zanzibar          |                  | Tender nut and copra                                  |
| 3     | San Roman                    | Philippines       |                  | High yielding with large nuts                         |
| 4     | Gonthembili                  | Sri Lanka         |                  | Tender nut and copra                                  |
| 5     | Java Tall                    | Indonesia         |                  | Big nut with high kernel, suitable for tender nut     |
| 6     | Federated Malay States (FMS) | Malaysia          |                  | Tender nut and copra, Drought tolerance               |
| 7     | British Solomon Island (BSI) | Solomon islands   |                  | Tender nut and copra                                  |
| 8     | St. Vincent                  | Trinidad & Tobago |                  | Tender nut and copra                                  |
| 9     | Malayan Green Dwarf (MGD)    | Malaysia          |                  | Good quality tender nut water, root wilt resistance   |
| 10    | Tiptur Tall                  | India             |                  | Leaf spot resistance                                  |
| 11    | Guam                         | Guam Island       |                  | Local cultivar of Guam Island                         |
| 12    | Ceylon Tall                  | Sri Lanka         | 1990             | High copra and oil content                            |
| 13    | Jamaica Tall                 | Jamaica           |                  | Tender nut and copra                                  |
| 14    | Seychelles Tall              | Seychelles Island |                  | High yielder and copra content                        |
| 15    | Laccadive Ordinary (LO)      | India             |                  | Excellent for toddy and high oil                      |
| 16    | East Coast Tall (ECT)        | India             |                  | Tender nut and copra                                  |
| 17    | Andaman Giant (AG)           | India             |                  | Large nuts, Drought tolerance                         |
| 18    | Cochin China (CC)            | Vietnam           |                  | Good toddy yielder                                    |
| 19    | Nadora Tall                  | India             |                  | 1994  |

**Table.2** Growth and reproductive attributes of coconut genotypes under Aliyarnagar condition

| <b>Genotypes</b>                    | <b>Palm height (m)</b> | <b>Trunk Girth (m)</b> | <b>No. of functional leaf/palm/year</b> | <b>Petiole length (m)</b> | <b>Length of leaflet bearing portion (m)</b> | <b>No. of inflorescence/palm/year</b> |
|-------------------------------------|------------------------|------------------------|---|---------------------------|--|---------------------------------------|
| <b>Arasampatti Tall (check)</b>     | 14.43                  | 1.05                   | 33.50                                   | 1.06                      | 4.40   | 12.20                                 |
| <b>Zanziber Tall</b>                | 15.38                  | 1.16                   | 38.00                                   | 1.22                      | 5.16   | 13.00                                 |
| <b>San Roman</b>                    | 14.57                  | 1.04                   | 38.00                                   | 1.37                      | 5.19   | 13.02                                 |
| <b>Gonthembili</b>                  | 13.20                  | 1.06                   | 36.00                                   | 1.13                      | 5.44   | 13.38                                 |
| <b>Java Tall</b>                    | 15.70                  | 1.14                   | 36.75                                   | 1.50                      | 5.64   | 12.63                                 |
| <b>Federated Malay States (FMS)</b> | 15.44                  | 1.26                   | 35.50                                   | 1.26                      | 5.62   | 12.37                                 |
| <b>British Solomon Island (BSI)</b> | 13.37                  | 0.91                   | 35.75                                   | 1.38                      | 5.54   | 12.94                                 |
| <b>St. Vincent</b>                  | 12.31                  | 1.07                   | 34.50                                   | 1.44                      | 5.35   | 12.29                                 |
| <b>Malayan Green Dwarf (MGD)</b>    | 14.40                  | 1.03                   | 37.00                                   | 1.36                      | 4.77   | 12.67                                 |
| <b>Tiptur Tall</b>                  | 9.51                   | 0.85                   | 29.25                                   | 1.09                      | 4.59   | 11.56                                 |
| <b>Guam</b>                         | 7.59                   | 0.97                   | 29.55                                   | 1.20                      | 4.60   | 12.56                                 |
| <b>Ceylon Tall</b>                  | 11.33                  | 0.99                   | 38.25                                   | 1.30                      | 5.59   | 13.39                                 |
| <b>Jamaica Tall</b>                 | 8.56                   | 0.96                   | 36.75                                   | 1.18                      | 4.17   | 12.50                                 |
| <b>Seychelles Tall</b>              | 10.44                  | 0.97                   | 36.25                                   | 1.40                      | 4.51   | 14.16                                 |
| <b>Laccadive Ordinary (LO)</b>      | 11.36                  | 1.10                   | 35.75                                   | 1.43                      | 5.24   | 13.80                                 |
| <b>East Coast Tall (ECT)</b>        | 10.58                  | 0.78                   | 38.00                                   | 1.17                      | 5.74   | 13.27                                 |
| <b>Andaman Giant (AG)</b>           | 12.04                  | 1.26                   | 37.50                                   | 1.43                      | 5.82   | 13.14                                 |
| <b>Cochin China (CC)</b>            | 9.81                   | 1.06                   | 37.00                                   | 1.37                      | 5.10   | 12.79                                 |
| <b>Nadora Tall</b>                  | 11.85                  | 1.14                   | 31.50                                   | 1.53                      | 5.84   | 13.57                                 |
| <b>Mean</b>                         | 12.20                  | 1.04                   | 35.52                                   | 1.30                      | 5.17   | 12.91                                 |
| <b>SE(d)</b>                        | 0.89                   | 0.04                   | 1.08                                    | 0.08                      | 0.17   | 0.21                                  |
| <b>CD(P=0.05)</b>                   | 2.63                   | 0.12                   | 3.20                                    | 0.25                      | 0.51   | 0.61                                  |
| <b>CV (%)</b>                       | 10.27                  | 5.51                   | 4.29                                    | 9.02                      | 4.72   | 2.25                                  |

**Table.3** Yield and nut quality characters of coconut genotypes under Aliyarnagar condition

| Genotypes                    | No. of bunches/<br>palm/yr | Nuts/palm/<br>year | Whole nut<br>wt. (g) | Dehusked<br>nut wt. (g) | Husk wt. (g) | Kernel wt.<br>(g) | Copra<br>content (g) |
|------------------------------|----------------------------|--------------------|----------------------|-------------------------|--------------|-------------------|----------------------|
| Arasampatti Tall (check)     | 11.50                      | 108.75             | 835.00               | 512.00                  | 187.00       | 246.50            | 119.00               |
| Zanziber Tall                | 12.75                      | 107.50             | 1261.00              | 541.00                  | 556.50       | 260.00            | 165.00               |
| San Roman                    | 12.17                      | 80.25              | 1982.50              | 1225.00                 | 677.50       | 485.00            | 254.50               |
| Gonthembili                  | 12.73                      | 104.92             | 1279.00              | 556.50                  | 482.50       | 260.50            | 178.00               |
| Java Tall                    | 12.42                      | 118.17             | 1508.50              | 790.50                  | 492.50       | 376.00            | 173.50               |
| Federated Malay States (FMS) | 11.88                      | 100.83             | 1498.50              | 733.50                  | 535.50       | 352.00            | 185.50               |
| British Solomon Island (BSI) | 11.69                      | 98.50              | 1545.00              | 688.50                  | 620.50       | 302.50            | 208.50               |
| St. Vincent                  | 11.50                      | 114.25             | 1425.50              | 685.00                  | 616.00       | 325.00            | 184.50               |
| Malayan Green Dwarf (MGD)    | 11.81                      | 111.25             | 1064.50              | 642.50                  | 223.00       | 359.00            | 175.00               |
| Tiptur Tall                  | 10.13                      | 67.25              | 972.50               | 566.50                  | 323.50       | 269.50            | 151.50               |
| Guam                         | 11.33                      | 99.17              | 1236.50              | 675.00                  | 303.00       | 325.00            | 191.00               |
| Ceylon Tall                  | 12.98                      | 119.33             | 1375.00              | 730.00                  | 552.50       | 362.50            | 170.50               |
| Jamaica Tall                 | 11.67                      | 131.92             | 1375.00              | 723.00                  | 550.00       | 344.50            | 128.00               |
| Seychelles Tall              | 13.36                      | 211.50             | 1130.00              | 644.00                  | 387.50       | 318.50            | 216.00               |
| Laccadive Ordinary (LO)      | 12.87                      | 137.50             | 1217.75              | 618.00                  | 437.50       | 300.50            | 154.50               |
| East Coast Tall (ECT)        | 13.05                      | 127.42             | 1329.00              | 743.00                  | 406.50       | 281.00            | 145.50               |
| Andaman Giant (AG)           | 12.58                      | 117.50             | 1999.50              | 1323.00                 | 489.50       | 510.00            | 390.50               |
| Cochin China (CC)            | 11.75                      | 153.67             | 990.00               | 519.00                  | 375.00       | 232.50            | 142.50               |
| Nadora Tall                  | 12.75                      | 125.50             | 1219.50              | 640.00                  | 460.00       | 316.50            | 180.00               |
| Mean                         | 12.15                      | 117.64             | 1328.64              | 713.47                  | 456.63       | 327.74            | 184.92               |
| SE(d)                        | 0.13                       | 8.55               | 60.60                | 37.90                   | 54.31        | 18.88             | 17.96                |
| CD(P=0.05)                   | 0.40                       | 25.40              | 180.06               | 112.61                  | 161.37       | 56.09             | 53.38                |
| CV (%)                       | 1.56                       | 10.28              | 6.45                 | 7.51                    | 16.82        | 8.15              | 13.74                |

A wide variation was observed for nut yield and nut characters among the coconut genotypes (Table 3). The maximum number of bunches per palm per year was recorded by Seychelles Tall (13.36) followed by East Coast Tall (13.05) compared to minimum values recorded by Tiptur Tall (10.13). Significantly highest pooled nut yield per palm per year was recorded by Seychelles Tall (211.50 nuts) compared to lowest recorded by Tiptur Tall (67.25 nuts). The genotypes Andaman Giant recorded higher nut characters *viz.*, whole nut weight (1999.50 g) and dehusked nut weight (1323.00 g), kernel weight (510.00 g) and copra content (390.50 g) followed by San Ramon (1982.50 g, 1225.00 g, 485.00 g and 254.50 g, respectively) compared to lowest recorded by Arasampatti Tall (835.00 g, 512.00 g, 246.50 g and 119.00 g, respectively). However, the highest husk weight (677.50 g) was recorded by San Roman, on par with BSI (620.50 g) and St. Vincent (616.00 g) compared to lowest recorded by Arasampatti Tall (187.00 g). The maximum number of nut yield may be due to the increased production of inflorescence per palm per year and number of functional leaves per year which might have contributed higher photosynthetic accumulation towards the reproductive phase. Higher copra content might be due to the higher yield and higher kernel weight. Jayabose *et al.*, (2008) reported that among ten Coconut tall cultivars Cochin China Tall (CCT) showed the high kernel weight followed by Philippines Ordinary Tall (PHOT). In the present investigation results are in agreement with Jerard (2002); Basavaraju *et al.*, (2011); Suchitra (2014) and Ramanandam *et al.*, (2017).

Though the number of nut was maximum in genotypes Seychelles Tall but considering to the quantitative and qualitative characters it revealed that genotypes Andaman Giant showed significantly higher quantitative and

qualitative characters compared to other genotypes. Hence, the study concluded that the genotype Andaman Giant is considered to be more suitable for further crop improvement programme under Aliyarnagar condition.

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**How to cite this article:**

Tripura, U., P. Paramaguru, J. Suresh, N. Kumaravadivel, A. Subramanian and Shoba, N. 2018. Performance of Indigenous and Exotic Coconut Germplasm for Yield and Nut Quality under Aliyarnagar Condition. *Int.J.Curr.Microbiol.App.Sci.* 7(02): 2611-2617.

doi: <https://doi.org/10.20546/ijcmas.2018.702.318>