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## Potential coconut hybrids of location specific cross combinations for the maidan tract of Karnataka

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### Abstract

Six hybrid cross combinations of coconut cultivars were assessed at the Horticultural Research and Extension Centre in Arsikere, along with a routine check for their growth, blooming behavior, yield, and yield-attributing features under the Karnataka maidan tract. The cross combinations viz., Tiptur Tall × Philippines Ordinary Tall (TPT × PHOT), Tiptur Tall × Laccadive Ordinary Tall (TPT × LCOT), Laccadive Ordinary Tall × Malayan Yellow Dwarf (LCOT × MYD), Laccadive Ordinary Tall × Malayan Orange Dwarf (LCOT × MOD), Tiptur Tall × Malayan Yellow Dwarf (TPT × MYD), Tiptur Tall × Malayan Orange Dwarf (TPT × MOD) along with the local check Tiptur Tall (TPT) cultivar were planted at the spacing of 7.5 m × 7.5 m during the year 2012. Observations with respect to growth parameters like palm height, number of annual leaf production, total functional leaves at crown per palm and number of inflorescences produced per year per palm were recorded. Pooled data of last four years reveals that among the hybrid combinations evaluated T<sub>6</sub>-TPT × MOD consistently recorded superior performance with respect to annual leaf production (12.63), total number of functional leaves per palm (28.75), number of inflorescence per palm per year (12.52), nut yield (103.54 nuts/palm) copra content (147.25 g/nut) and copra yield per palm (15.45kg/palm). It is therefore recommended for multi-location trials to assess its stability and adaptability across different environmental conditions before release for commercial cultivation in the maidan tract of Karnataka

**Keywords:** Coconut hybrids, nut yield, copra content, copra yield

### Introduction

Coconut (*Cocos nucifera* L.) is an important plantation crop of the tropics cultivated in more than 80 countries across the globe. It is an multipurpose crop, cultivated widely in humid tropics and popularly known as 'Kalpavriksha' in India which provides nutritious food and refreshing drink, oil for edible and non-edible uses, fibre of commercial value, shell for fuel and industrial uses. In recent years, coconut is being increasingly considered as a health food. Coconut is a Perennial plantation crop of immense economic and social importance in India, supporting the livelihood of millions of small and marginal farmers. India ranks third in area and first in production of coconut in the world. As per the latest statistics available (2018-19), the annual coconut production in India is 23.90 billion nuts from an area of 2.15 million ha with an average productivity of 9897 nuts/ha. The four southern states viz., Kerala, Tamil Nadu, Karnataka and Andhra Pradesh are the major coconut producing states in India, accounting for more than 90 per cent of the area and production. It has been demonstrated that a four-fold increase in yield can be achieved by adopting scientific technologies (Subramanian *et al.*, 2020) [14].

Superior varieties chosen following germplasm evaluation have been used in crop improvement programs to create high-yielding hybrids. Evaluation of location specific high yielding hybrid combinations with specific growth and yield characteristic are very important in this crop to achieve higher production and productivity. The discovery of hybrid vigour in coconut palms was first unveiled in India during 1937 (Patel, 1937) [10], received considerable attention in the production of coconut hybrids. When opposed to hybrids and tall cultivars, which are more susceptible to unfavorable conditions and typically have lower yields, selections from dwarf cultivars are very ideal for tender nut purpose. Hybrids usually express hybrid vigour in growth precocity and higher yield. A large number of hybrid combinations of Tall × dwarf (T×D), Dwarf × Tall (D×T) and Tall× Tall (T×T) have been developed and evaluated over years in different locations (Basavaraju *et al.*, 2011) [2].

Due to the effort of crop improvement so far, 20 high yielding hybrids are released at the state/country level in coconut and still there is a good scope for exploitation of heterotic effects (CPCRI, 2014 and Maheswarappa *et al.*, 2016) [4, 7]. The goal of the coconut hybridization programs is to find heterosis for characteristics like early flowering and bearing, increased copra and nuts, and adaptation to a variety of agroclimatic situations. Inter-varietal crossings of Dwarf × Tall and Tall × Dwarf types are used in the majority of hybrid evaluation experiments to determine whether hybrids are superior than local tall cultivars in terms of precocity, number of nuts per hectare, and copra/nut. The expression of hybrid vigour was influenced by the local environment (Chapman *et al.*, 2000) [3] and hence evaluation of hybrids at different locations is highly nursery to ascertain their suitability to a particular locality. In this context present study was undertaken to evaluate six hybrid coconut varieties along with a standard check for their growth, flowering behaviour, yield, and yield attributing traits under the *maidan* tract of Karnataka. The *maidan* tract of Karnataka represents a distinct agro-climatic zone characterized by relatively low rainfall, high temperature fluctuations, and intermittent moisture stress. The performance of coconut hybrids in such environments depends largely on their adaptive capacity and yield stability. Because native varieties are more common and scientific production practices are not being adopted, productivity levels in Karnataka's coconut-growing regions are below potential output. Finding the right hybrid for a given agroclimatic area is crucial to increasing and maintaining productivity. Systematic evaluation under specific agro-ecological conditions is necessary before their recommendation for large-scale cultivation. In this context, the experiment was designed and carryout in the *maidan* tract of Karnataka.

## Materials and Methods

The experiment was carried out at the Horticultural Research and Extension Centre, located in the *midan* tracts of Karnataka state. The area laying to the east of malanad region characterised by rain shadow area of Western Ghats and is generally much drier than costal and malanad regions. Area is located in longitude of 76.5°E, Latitude 13°15' N altitude at 800 MSL. In These tracts the mean minimum temperature of 18.90°C, the mean maximum temperature 31.78°C and the average annual rainfall 704.80 mm were recorded in 36 rainy days during the period of experiment. Peak rainfall was recorded during May-June and September and October months. The Horticulture Research Station, Arsikere is located in the maidan tract of Karnataka, which is the area lying to the east of malnad region (hilly areas) in Karnataka and characterized by open plain area with few hillocks. Maidan tract is the rain shadow area of Western Ghats and is generally much drier than coastal and malnad regions. The soil of the experimental site was clay loam with low in available N (182.5 kg/ha), medium in available P (12.5 kg/ha) and high in available K (280 kg/ha).

The experiment was laid out in a Randomized Block Design (RBD) with seven treatments, four replications and six palms per treatment. Pits of 1 m × 1 m × 1 m size were dug at a spacing of 7.5 m × 7.5 m and filled with a mixture of sand, red soil, and Farm Yard Manure. Seedlings of different hybrids procured from All India Coordinated Research Project (AICRP), plantation crops, Kasaragod,

Kerala. The cross combinations viz., Tiptur Tall × Philippines Ordinary Tall (TPT × PHOT), Tiptur Tall × Laccadive Ordinary Tall (TPT × LCOT), Laccadive Ordinary Tall × Malayan Yellow Dwarf (LCOT × MYD), Laccadive Ordinary Tall × Malayan Orange Dwarf (LCOT × MOD), Tiptur Tall × Malayan Yellow Dwarf (TPT × MYD), Tiptur Tall × Malayan Orange Dwarf (TPT × MOD) along with the local check Tiptur Tall (TPT) cultivar were planted during the year 2012. Recommended practises were followed as described in the package of practices University of Horticultural Sciences, Bagalkot. Palms were irrigated at 35-40 litters/day/palm through drip irrigation system. Observations with respect to growth parameters like palm height, number of annual leaf production, total functional leaves at crown per palm and number of inflorescences produced per year per palm were recorded. Yield parameters were also recorder for the characters like number of nuts harvested per palm, copra content per nut and copra yield per palm recorded. Mean yield data of last 4 years were subjected to statistical analysis following standard procedures for RBD (Panse and Sukhatme 1985) [9].

## Results and Discussion

### Growth characters

The data pertaining to growth parameters of the different hybrids with standard check were presented in Table.1. Observations regarding growth characteristics showed significant differences among the treatments. The maximum average palm height of 3.39 m was recorded in check T<sub>7</sub> (TPT), and was followed by the hybrid combination T<sub>2</sub>-TPT × LCOT (3.36 m), T<sub>3</sub>-LCOT × MYD (3.32 m) and T<sub>6</sub>-TPT × MOD (3.21 m). Whereas lowest average palm height was recorded in hybrid combination T<sub>4</sub>-LCOT × MOD (2.97 m). Maximum average number of annual leaf production was recorded in hybrid combination T<sub>6</sub>-TPT × MOD (12.63) followed by T<sub>2</sub>-TPT × LCOT (11.96) and T<sub>4</sub>-LCOT × MOD (11.93). Cultivar T<sub>7</sub>-TPT (11.45) has recorded the lowest values. With respect to average total numbers of functional leaves per palm revealed that hybrid combination T<sub>6</sub>-TPT × MOD (28.75) has recorded maximum numbers of functional leaves per palm followed by T<sub>5</sub>-TPT × MYD (26.53) and T<sub>4</sub>-LCOT × MOD (25.64). Minimum numbers of functional leaves were recorded in T<sub>1</sub>-TPT × PHOT (24.09). Average maximum number of inflorescences per palm per year was recorded in T<sub>6</sub>-TPT × MOD (12.52) followed by T<sub>5</sub>-TPT × MYD (11.81) and T<sub>4</sub>-LCOT × MOD (11.64). Minimum values were recorded in T<sub>3</sub>-LCOT × MYD (11.08). The observed variability reflects the inherent genetic differences among the hybrid combinations and cultivar and their differential adaptation to the local agro-climatic conditions. Jerard (2002) [6]; Ramanandam *et al.*, (2017) [11] also reported the similar results. Similar result of the highest number of functional leaves was reported by Basavaraju *et al.* (2011) [12] in GBGD × PHOT cross combination.

### Yield and yield characters

Average yield characters of location specific coconut hybrids were presented in (Table.2, Figure.1) Pooled average yield data of four years (2022 to 2025) revealed significant variations among different yield characters. Number of nuts harvested per palm was maximum in T<sub>6</sub>-TPT × MOD (103.54) followed by T<sub>5</sub>-TPT × MYD (99.75) and T<sub>4</sub>-LCOT × MOD (82.61). Similar results of higher nut yield per palm was reported by Basavaraju *et al.*, (2011) [12],

Rao *et al.*, (2002) <sup>[12]</sup> and Anon., (2008) <sup>[11]</sup>. Heterotic effects with respect to nut yield in coconut were also reported earlier Natarajan *et al.*, (2006) <sup>[8]</sup> and Jayabose (2008) <sup>[5]</sup>. Whereas minimum nuts were harvested in check T<sub>7</sub> (TPT). Highest copra content was recorded in T<sub>6</sub>-TPT × MOD (147.25 g/nut) followed by T<sub>5</sub>-TPT × MYD (139.42 g/nut) and T<sub>2</sub>-TPT × LCOT (133.42 g/nut). Lowest copra content was recorded in T<sub>3</sub>-LCOT × MYD (102.00 g/nut). Similarly maximum copra yield was recorded in T<sub>6</sub>-TPT × MOD (15.45 kg/palm) followed by T<sub>5</sub>-TPT × MYD (14.08 kg/palm). Whereas minimum copra yield was recorded in T<sub>3</sub>-LCOT × MYD (7.94 kg/palm). Superior performance of hybrid combination T<sub>6</sub>-TPT × MOD can be attributed to

production of more number of inflorescence per year, production of more number of nuts per palm and copra yield per palm with balanced vegetative growth. (Selvaraj and Maheswarappa. 2016) <sup>[7]</sup>. Among the nine coconut hybrids evaluated, the cross combinations involving dwarf as female parent (Gangabondam) and tall cultivars as male parent, viz. GBGD × LCOT, GBGD × PHOT and GBGD × FJT performed superior and recorded significantly higher nut yield (128.6, 124.3 and 110.3 nuts palm<sup>-1</sup> year<sup>-1</sup>, copra yield 22.0, 19.8 and 16.3 copra kg palm<sup>-1</sup> year<sup>-1</sup>), with oil yield ranged from 11.5 to 13.8 kg palm<sup>-1</sup> year<sup>-1</sup> when compared to local check (Sumitha *et al.*, 2019) <sup>[15]</sup>.

**Table 1:** Growth characters of location specific coconut hybrids during the year 2024-25

| Treatments                  | Palm height (m) | Annual leaf production (No.) | Total number of Functional leaves/palm | No of inflorescence/palm/year |
|-----------------------------|-----------------|------------------------------|----------------------------------------|-------------------------------|
| T <sub>1</sub> -TPT x PHOT  | 3.14            | 11.79                        | 24.09                                  | 11.58                         |
| T <sub>2</sub> -TPT x LCOT  | 3.36            | 11.96                        | 24.49                                  | 11.61                         |
| T <sub>3</sub> -LCOT x MYD  | 3.23            | 11.88                        | 24.70                                  | 11.08                         |
| T <sub>4</sub> -LCOT x MOD  | 2.97            | 11.93                        | 25.64                                  | 11.67                         |
| T <sub>5</sub> -TPT x MYD   | 3.06            | 11.92                        | 26.53                                  | 11.81                         |
| T <sub>6</sub> -TPT x MOD   | 3.21            | 12.63                        | 28.75                                  | 12.52                         |
| T <sub>7</sub> -TPT (check) | 3.39            | 11.45                        | 24.35                                  | 11.44                         |
| S. Em ±                     | 0.17            | 0.37                         | 0.72                                   | 0.57                          |
| CD @ 5%                     | 0.49            | 1.09                         | 2.15                                   | 1.7                           |
| CV%                         | 10.35           | 6.15                         | 5.67                                   | 9.82                          |

**Table 2:** Yield characters of location specific coconut hybrids (Average of 4 years from 2022-25)

| Treatments                  | No. of nuts harvested/palm | Copra content (g/nut) | Copra yield (kg/palm) |
|-----------------------------|----------------------------|-----------------------|-----------------------|
| T <sub>1</sub> -TPT x PHOT  | 66.71                      | 119.42                | 8.08                  |
| T <sub>2</sub> -TPT x LCOT  | 67.17                      | 133.42                | 8.99                  |
| T <sub>3</sub> -LCOT x MYD  | 76.38                      | 102.00                | 7.94                  |
| T <sub>4</sub> -LCOT x MOD  | 82.61                      | 129.75                | 10.87                 |
| T <sub>5</sub> -TPT x MYD   | 99.75                      | 139.42                | 14.08                 |
| T <sub>6</sub> -TPT x MOD   | 103.54                     | 147.25                | 15.45                 |
| T <sub>7</sub> -TPT (check) | 72.30                      | 129.67                | 9.35                  |
| S. Em ±                     | 3.34                       | 0.84                  | 0.39                  |
| CD @ 5%                     | 9.92                       | 2.5                   | 1.15                  |
| CV%                         | 8.22                       | 1.31                  | 7.23                  |

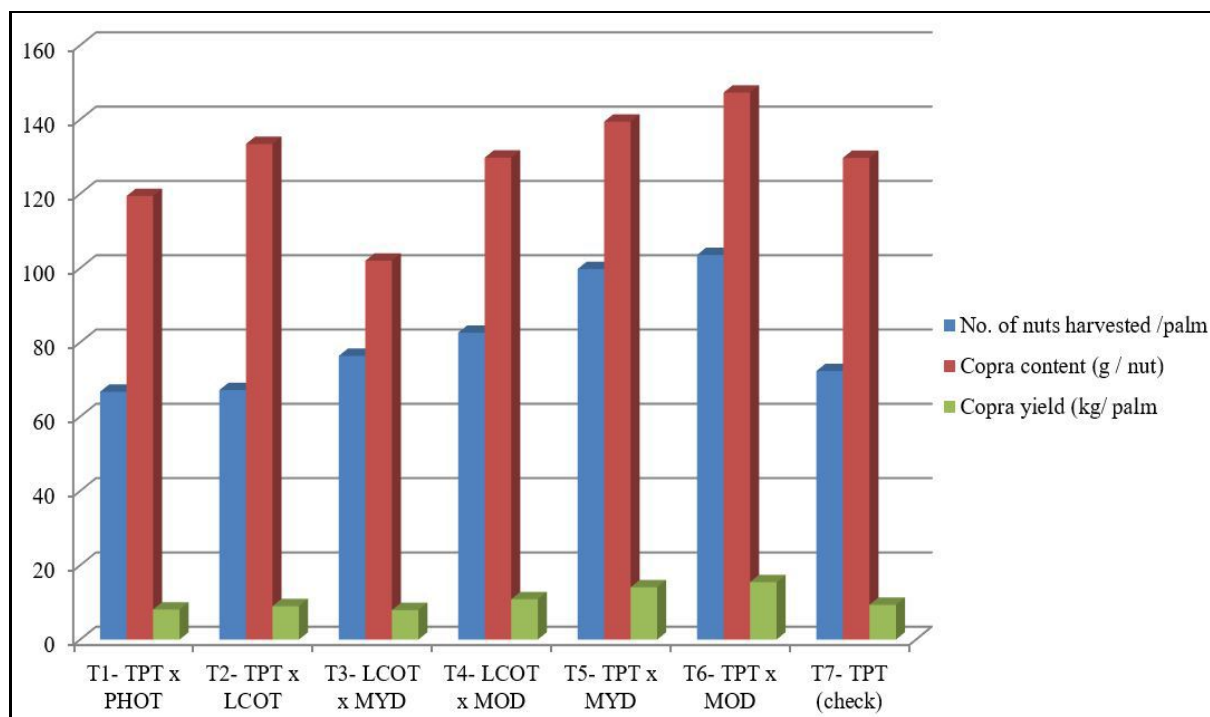


**Fig 1:** Yield characters of location specific coconut hybrids (Average of 4 years from 2022-25)

## Conclusion

Evaluation of different location specific coconut hybrid under the agro climatic of Arsikere revealed significant variation among the different hybrid combinations for growth parameters, copra production and nut yield. Among the hybrid combinations evaluated T<sub>6</sub>-TPT × MOD consistently recorded superior performance with respect to annual leaf production (12.63), total number of functional leaves per palm (28.75), number of inflorescence per palm per year (12.52), nut yield (103.54 nuts/palm) and copra yield per palm (15.45 kg/palm). This hybrid combination also exhibited higher copra content per nut (147.25 g/nut) which directly contributes to improved economic returns. Research findings of this experiment reveals that, the hybrid combination T<sub>6</sub>-TPT × MOD appears to be the promising hybrid combination. Hybrids show earliness in flowering and give increased yield, higher quantity and quality of copra and oil when compared to the parents. Location-specific cross combinations of coconut hybrids have demonstrated significant heterosis, providing higher nut yields, superior copra, and earlier bearing compared to local tall varieties. It is therefore recommended for multi-location trials to assess its stability and adaptability across different environmental conditions before release for commercial cultivation in the maidan tract of Karnataka. This study's findings will significantly assist scientists in enhancing their research and support cultivators in choosing the optimal coconut hybrid for planting, hence resulting in increased economic returns.

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## References

1. Anonymous, *et al.* AICRP on palms annual report 2007-08. Kasaragod: CPCRI; 2008.
2. Basavaraju TB, *et al.* Growth and yield performance of coconut hybrids in maidan tract of Karnataka. J Plant Crops. 2011;39(1):171-173.
3. Chapman SC, *et al.* Genotype × environment interactions affecting grain sorghum. I. Characteristics that confound interpretation of hybrid yield. Aust J Agric Res. 2000;51:197-207.
4. CPCRI, *et al.* Annual report 2013-14. Kasaragod: ICAR-Central Plantation Crops Research Institute; 2014.
5. Jayabose C, *et al.* Estimation of heterosis of economically important characters of coconut (*Cocos nucifera* L.) hybrids. J Plant Crops. 2008;36(3):151-154.
6. Jerard AB, *et al.* Studies on mean performance, variability, association analysis, stability and diversity in coconut (*Cocos nucifera* L.) genotypes [PhD thesis]. Coimbatore: Tamil Nadu Agricultural University; 2002.
7. Maheswarappa HP, *et al.* Coconut varietal improvement efforts of AICRP on palms. Tech Bull No. 104. Kasaragod: ICAR-Central Plantation Crops Research Institute; 2016. p. 22.

8. Natarajan C, *et al.* Performance of T×T coconut (*Cocos nucifera* L.) hybrids in Tamil Nadu. J Plant Crops. 2006;34(3):250-253.
9. Panse VG, *et al.* Statistical methods for agricultural workers. New Delhi: ICAR; 1985. p. 97-128.
10. Patel JS, *et al.* Coconut breeding. Proc Assoc Econ Biol. 1937;5:1-6.
11. Ramanandam G, *et al.* Potential coconut hybrids for yield and quality for coastal region of Andhra Pradesh (India). Indian J Agric Sci. 2017;87(8):1073-1076.
12. Rao DVR, *et al.* Evaluation of certain coconut crosses for heterosis. In: Proc Placrosym XV; 2002. p. 88-94.
13. Selvaraj VKS, *et al.* Variability and correlation in coconut germplasm for morphological and fruit characters. Adv Crop Sci Tech. 2016;4(3):221-222.
14. Subramanian P, *et al.* Coconut. Coconut Development Board; 2020. p. 1-62.
15. Sumitha S, *et al.* Potential coconut (*Cocos nucifera*) hybrids developed using Gangabondam (GBGD) as maternal parent for yield and quality for southern dry tract of Karnataka (India). Indian J Agric Sci. 2020;90(8):1467-1473.