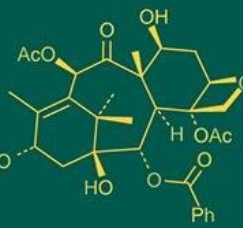
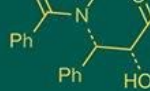


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; SP-10(4): 640-643
www.biochemjournal.com
Received: 12-01-2026
Accepted: 14-02-2026

Jagadeesha S K
Department of PSM&AC,
UHS, Bagalkot, Karnataka,
India

Kiran Kumar KC
Department of Plant
Pathology, UHS, Bagalkot,
Karnataka, India

Ramesh M
Technical Officer, AICRP,
Plantation Crops, HREC,
Arsikere, UHS, Bagalkot,
Karnataka, India

Augustine Jerard B
Project Coordinator, AICRP
on Plantation Crops, ICAR-
CPCRI, Kasaragod, Kerala,
India

Evaluation of Tall × Tall location specific Coconut hybrids under Southern Dry Zone of Karnataka

Jagadeesha SK, Kiran Kumar KC, Ramesh M and Augustine Jerard B

DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i4Sh.8176>

Abstract

Coconut (*Cocos nucifera* L.) is a perennial crop with multiple uses, it is believed to be an important plantation crop in the world. The crop is cultivated in more than 80 countries across the globe. Coconut production plays an important role in the national economy of India. Country ranks third in area and first in production of coconut in the world. Karnataka ranks second in the area (6.19 lakh hectares) and third in production (4947.74 million nuts) of coconut. Introduction of variety/hybrid and their Systematic evaluation under specific agro-ecological condition is very important to achieve higher production and productivity in coconut. With this broad objective present research was carried out to exploit the hybrid vigor under specific agro-ecological conditions by evaluating five Tall × Tall hybrid cross combinations along with the local check was carried out at the Horticultural Research and Extension Centre, Arsilere. Experimental results revealed that among the different Tall × Tall hybrid combinations evaluated T2-LCT × ADOT (Laccadive Ordinary Tall × Andaman Ordinary Tall) consistently recorded superior performance with respect to annual leaf production (12.13), total number of functional leaves per palm (28.00), number of inflorescence per palm per year (12.18), months to fifty per cent flowering (65 per cent), nut yield (86.69 nuts/palm), copra content (137.50 g/nut) and copra yield per palm (11.05kg/palm). Research findings of this experiment reveals that, the hybrid combination T2-LCT × ADOT appears to be the promising hybrid combination, It is therefore recommended for multi-location trials to assess its stability and adaptability across different environmental conditions before release for commercial cultivation under Southern Dry Zone of Karnataka

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

Introduction

Coconut (*Cocos nucifera* L.) is a perennial crop with multiple uses, it is believed to be an important plantation crop in the world. The crop is cultivated in more than 80 countries across the globe. Coconut production plays an important role in the national economy of India. India ranks third in area and first in production of coconut in the world. As per the latest statistics available 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) [12]. Karnataka ranks second in the area (6.19 lakh hectares) and third in production (4947.74 million nuts) of coconut. With respect to the districts of Karnataka, Tumkur, Hassan, Chitradurga and Chikkamagaluru are the major coconuts growing districts in Karnataka. Tumkur is the largest producer of coconut in Karnataka with an area of 1, 57,317 ha, production of 12,034 lakh nuts and productivity of 7,650 nuts/ha. Hassan is the second-largest producer of coconut with an area of 52,325 ha, production of 2,058 lakh nuts and productivity of 3,934 nuts/ha in 2018 (Anonymous, 2019) [1]. Coconut (*Cocos nucifera* L.) is a perennial crop with multiple uses, it is believed to be an important plantation crop in the world. The crop is cultivated in more than 80 countries across the globe. Coconut production plays an important role in the national economy of India. India ranks third in area and first in production of coconut in the world. from an area of 2.15 million ha with an average productivity of 9897 nuts/ha.

Corresponding Author:
Jagadeesha S K
Department of PSM&AC,
UHS, Bagalkot, Karnataka,
India

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) ^[12]. Karnataka ranks second in the area (6.19 lakh hectares) and third in production (4947.74 million nuts) of coconut. With respect to the districts of Karnataka, Tumkur, Hassan, Chitradurga and Chikkamagaluru are the major coconuts growing districts in Karnataka. Tumkur is the largest producer of coconut in Karnataka with an area of 1,57,317 ha, production of 12,034 lakh nuts and productivity of 7,650 nuts/ha. Hassan is the second-largest producer of coconut with an area of 52,325 ha, production of 2,058 lakh nuts and productivity of 3,934 nuts/ha in 2018 (Anonymous, 2019) ^[1]. The major classification of coconut is based on stature and breeding behavior of the group, coconut broadly categorized in to two groups viz., Tall and dwarf. Tall types are predominantly out- crossing while the dwarf type is mainly self-pollinating (with a few exceptions) (Augustine Jerard *et.al.*, 2015) ^[3]. The Tall cultivars are the most common, commercially cultivated in all coconut growing regions of the world while the Dwarf varieties are usually grown for ornamental and breeding purpose. The Tall and Dwarf types have been utilized for development of hybrid varieties. Hybrids usually express hybrid vigor in growth, precocity and higher yields was reported for the first from India during 1937 (Patel, 1937) ^[8], Tall cultivars average yield potential is around 80 nuts/palm/year (Ramanandam *et. al.*, 2018) ^[9]. Despite its importance, coconut productivity in many regions remains suboptimal due to factors such as poor genetic material, climatic stress, and inadequate management practices. One of the most effective strategies for improving coconut productivity is the development and evaluation of hybrids with superior yield potential and adaptability. Tall $\times$ Tall hybrids are particularly important as they combine desirable traits such as robustness, adaptability to diverse environments, and stable yield performance. Hence, introduction of variety/hybrid and their Systematic evaluation under specific agro-ecological condition is very important to achieve higher production and productivity in coconut. With this broad objective present research was carried out to exploit the hybrid vigor under specific agro-ecological conditions by evaluating five Tall $\times$ Tall hybrid cross combinations along with the local check under Southern Dry Zone of Karnataka.

Materials and Methods

The experiment was carried out at the Horticultural Research and Extension Centre, Arsikere, located in the Southern Dry Zone 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 76.50E, Latitude 13.0151 N altitude at 800 MSL. In these tracts the mean minimum temperature of 18.900C, the mean maximum temperature 31.780C 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 soil of the experimental site was clay loam in nature. The experiment was laid out in a Randomized Block Design (RBD) with six treatments, four replications and six palms per treatment. Pits of 1 m $\times$ 1 m $\times$ 1 m size were dug at a spacing of 7.5 m $\times$ 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., West Cost Tall $\times$ Tiptur Tall (WCT $\times$ TPT), Laccadive Ordinary Tall $\times$ Andaman Ordinary Tall (LCT $\times$ ADOT), Benaulim Tall $\times$ Andaman Ordinary Tall (BENT $\times$ ADOT), East Coast Tall $\times$ Laccadive Ordinary Tall (ECT $\times$ LCT), Andaman Ordinary Tall $\times$ East Coast Tall (ADOT $\times$ ECT), 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 liters/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, number of inflorescences produced per year per palm and months to fifty per cent flowering 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 was recorded. Mean yield data of last 4 years were subjected to statistical analysis of variance (ANOVA) for RBD. Treatment means were compared using Critical Difference (CD) at 5% significance level, following standard procedures for RBD (Panse and Sukhatme 1985) ^[7].

Results and Discussion

Growth characters

The data related to growth parameters of the different hybrid combinations with standard check were presented in Table.1. Observations regarding growth characteristics showed significant differences among the treatments. With respect to palm height, maximum palm height of 3.74 m was recorded in T4 -ECT $\times$ LCT hybrid combination followed by T6- TPT (Check) (3.72 m) and the minimum palm height of 3.22 m was recorded in T3 -BENT $\times$ ADOT hybrid combination. With respect to number of annual leaf production T2 -LCT $\times$ ADOT recorded the highest number of annual leaf production (12.13) followed by T5 -ADOT $\times$ ECT (12.10) whereas, the lowest number of annual leaf production was recoded in T4 -ECT $\times$ LCT hybrid combination (11.48). Similarly, the maximum total number of functional leaves per palm was recorded in T2 -LCT $\times$ ADOT (28.00) followed by T3 -BENT $\times$ ADOT (26.05) and the minimum total number of functional leaves per palm was recorded in T1 -WCT $\times$ TPT (23.95).

With respect to number of inflorescence per palm per year the hybrid combination T2 -LCT $\times$ ADOT recorded the highest values (12.18) followed by T5 -ADOT $\times$ ECT (11.98) and T6- TPT (Check) (11.88). Whereas, lowest values were recorded in T1 -WCT $\times$ TPT (10.65) hybrid combination. Result pertaining to months to fifty per cent flowering revels that, very early attainment of fifty per cent flowering was recorded in T2 -LCT $\times$ ADOT hybrid combination (65 days) followed by T3 -BENT $\times$ ADOT (68 days) and T1 -WCT $\times$ TPT (71 days) whereas, very late attainment of fifty present flowering was observed in T5 -ADOT $\times$ ECT (78 days) hybrid combination.

Yield and yield characters

Average yield characters of location specific coconut hybrid combinations 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 hybrid combination T2 -LCT $\times$ ADOT (86.69) followed by T4 -ECT $\times$ LCT (68.94) and T6- TPT (Check) (51.49) whereas, minimum Number of nuts harvested per palm was recorded in

T5 -ADOT × ECT (40.74). Similar results of higher nut yield per palm was reported by Basavaraju *et al.*, (2011) ^[4], Rao *et al.*, (2002) ^[10] and Anon., (2008) ^[2]. Heterotic effects with respect to nut yield in coconut were also reported earlier Natarajan *et al.*, (2006) ^[6] and Jayabose (2008) ^[5]. Highest copra content was recorded in hybrid combination T2 -LCT × ADOT (137.50 g/nut) followed by T5 -ADOT × ECT (134.60 g/nut) and T1 -WCT × TPT (128.20 g/nut). The lowest copra content was recorded in T6- TPT (Check) (97.70 g/nut). Similarly the maximum copra yield was recorded in T2 -LCT × ADOT (11.05 kg/palm) followed by T4 -ECT × LCT (8.38

kg/palm), followed by T1 -WCT × TPT (6.23 kg /palm). Whereas the minimum copra yield was recorded in hybrid combination T6- TPT (Check) (5.03 kg/palm). Superior performance of hybrid combination T2-LCT × ADOT can be attributed to production of more number of annual leaves, total number of functional leaves per palm, number of inflorescence per palm per year, months to 50 per cent flowering, number of nuts harvested per palm, copra content and copra yield. Similar results were also reported by Selvaraj and Maheswarappa (2016) ^[11].

Table 1: Growth characters of location specific Tall X Tall 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	Months to 50% flowering
T ₁ -WCT x TPT	3.32	12.00	23.95	10.65	71
T ₂ -LCT x ADOT	3.55	12.13	28.00	12.18	65
T ₃ -BENT x ADOT	3.22	11.50	26.05	11.70	68
T ₄ -ECT x LCT	3.74	11.48	24.03	11.53	76
T ₅ -ADOT X ECT	3.40	12.10	24.80	11.98	78
T ₆ -Check (TPT)	3.72	12.00	24.19	11.88	77
S. Em±	0.22	0.29	0.62	0.38	1.39
CD @ 5%	0.66	0.88	1.88	1.15	2.97
CV%	12.61	4.9	4.95	6.56	5.83

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

Treatments	No. of nuts harvested /palm	Copra content (g / nut)	Copra yield (kg/ palm)
T ₁ -WCT x TPT	48.56	128.20	6.23
T ₂ -LCT x ADOT	86.69	137.50	11.92
T ₃ -BENT x ADOT	47.82	105.70	5.05
T ₄ -ECT x LCT	68.94	121.60	8.38
T ₅ -ADOT X ECT	40.74	134.60	5.48
T ₆ -Check (TPT)	51.49	97.70	5.03
S. Em±	2.83	1.86	2.34
CD @ 5%	8.54	5.85	6.86
CV%	9.87	2.66	6.29

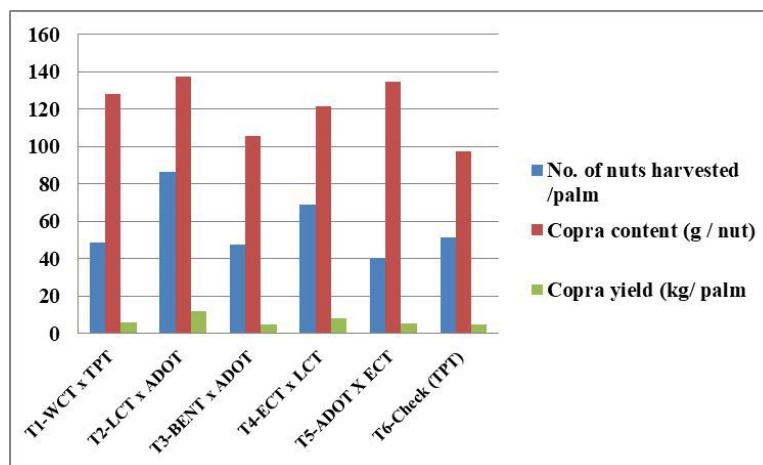


Fig 1: Yield characters of location specific Tall X Tall coconut hybrids (Average of 4 years from 2022-25)

Conclusion

Evaluation of different location specific Tall × Tall coconut hybrid combinations under the agro climatic conditions of Arsikere revealed significant variation among the different Tall × Tall hybrid combinations for growth and yield characteristics. Among the different Tall × Tall hybrid combinations evaluated T2-LCT × ADOT consistently recorded superior performance with respect to annual leaf production (12.13), total number of functional leaves per palm (28.00), number of inflorescence per palm per year (12.18), months to fifty per cent flowering (65 per cent), nut yield

(86.69 nuts/palm), copra content (137.50 g/nut) and copra yield per palm (11.05kg/palm). The highest nut yield of this hybrid combination directly contributes to improved economic returns. Research findings of this experiment reveals that, the hybrid combination T2-LCT × ADOT appears to be the promising hybrid combination. It is therefore recommended for multi-location trials to assess its stability and adaptability across different environmental conditions before release for commercial cultivation under Southern Dry Zone of Karnataka.

Acknowledgement

The financial assistance and facilities provided by AICRP on Plantation Crops to take up this study is gratefully acknowledged. The authors are thankful to Dr.B.Augustine Jerard Project Coordinator (Plantation Crops), CPCRI, Kasaragod and Director of Research, UHS, Bagalkot for their constant encouragement and support.

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