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Performance of different Arecanut (*Areca catechu* L.) cultivars under Malnad region of Karnataka

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Abstract

Ten-year-old arecanut palms were evaluated for growth and yield performance at Agricultural and Horticultural Research Station, Thirthahalli. The study comprised of eight cultivars such as Thirthahalli local, Sagar local, Tarikere local, SAS-1, Mangala, Sumangala, Sreemangala and Mohit Nagar. Among the cultivars, the growth performance of SAS-1 was superior as it recorded the maximum palm height (8.93 m), internodal distance (17.35 cm), stem diameter (17.85 cm) and the minimum number of nodes per unit length (5.50). Whereas, the cultivar Mangala recorded the poor growth performance by recording lowest palm height (6.83 m), internodal distance (11.76 cm), stem diameter (13.08 cm) and highest number of nodes per meter length (8.64). The fresh bunch yield was found to be highest in Mohit Nagar (20.25 kg/palm) and lowest in SAS-1 (11.64 kg/palm). Both the kalipak and chali yield per palm were maximum in Thirthahalli local (2.84 kg and 3.30 kg, respectively). In comparison, Mangala recorded the lowest kalipak yield (1.79 kg/palm) and Sumangala recorded the minimum chali yield of 2.24 kg/palm.

Keywords: Arecanut, growth performance, fresh bunch yield, chali and kalipak yield

Introduction

Arecanut (*Areca catechu* L.), a member of the family Arecaceae or Palmae, is an important plantation crop grown in the Indian Sub-continent. This perennial crop is grown mainly in the Southern and North-Eastern states of the country. The nuts of the palm, which are popularly known as 'betel nut' or 'supari,' are used to prepare various masticatory products such as gutka, pan masala, pan etc. The nuts contain a stimulant named "arecoline," which ranges from 0.7 to 1.1 % in different products. The nuts are chewed as a stimulant by nearly 5 % of the world's population, making it the second most popular masticatory product next to tobacco. Apart from chewing, the nuts are also used in several religious ceremonies such as worshipping Gods, marriage, birth and offering to the guests as a mark of hospitality. Arecanut has an important place in the Indian system of medicine such as Ayurveda, Unani and Homeopathy. It is traditionally used to treat several ailments and has laxative, digestive, carminative, antiulcer, antidiarrhoeal, anthelmintic, antimalarial, antihypertension, diuretic, pro healing, antibacterial, hypoglycaemic and anti-heartburn activities (Bhat *et al.* 2017) [4].

India is the largest producer of arecanut in the world. In the country, the crop is predominantly grown in the Malnad region of Karnataka state, covering the western and eastern slopes of the Western Ghats in the districts of Uttara Kannada, Chikmagalur, Shivamogga, Hassan, Kodagu and Belgaum. The traditional arecanut growing tract lies in this part of the state, making Karnataka the largest producer, contributing nearly 63.16 % to the country's total production (Anon., 2019a) [2]. But the productivity of the crop is 2,169 kg/ha/year (Anon., 2019b) [3] in Karnataka and there is a considerable scope to increase productivity by adopting high yielding cultivars or hybrids. As arecanut is a highly cross-pollinated crop with a heterogeneous population, its performance over the locations must be tested to recommend suitable high yielding cultivars or hybrids to the region. Hence this study was undertaken to identify the suitable arecanut cultivar for the Malnad region of Karnataka.

Materials and Methods

The present study was conducted at Agricultural and Horticultural Research Station, Thirthahalli, which comes under the administrative jurisdiction of UAHS, Shivamogga. The experimental area representing the Malnad region is located at 13°41' 93" North latitude and 75°13' 88" East longitude and at an altitude of 600 m above the mean sea level (MSL). The average annual rainfall of the area is 3212.4 mm and it is well distributed over five months from June to October, with a peak during July and August.

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The experiment was laid out in Randomized Complete Block Design (RCBD) with eight cultivars replicated thrice. The cultivars used in the study were Thirthahalli local, Sagar local, Tarikere local, SAS-1, Mangala, Sumangala, Sreemangala and Mohit Nagar. The seedlings were field planted in 2010 with a spacing of 2.7 * 2.7 m. The palms were maintained by adopting a standard package of practices recommended for arecanut. Each plot consisted of 8 palms. The growth parameters such as palm height (m), stem diameter at 1 m height (cm), internodal distance (cm), number of nodes per meter length and number of opened leaves on the crown were recorded. The yield parameters such as fresh bunch yield per palm (kg), Kalipak yield (kg/palm) and Chali yield (kg/palm) were recorded. Here for processing into kalipak 6-7 months old bunches harvested, the fruits were de-husked and the kernels were boiled in kali (extract obtained by cooking 2-3 batches of areca nut) for 45-60 minutes on the same day of harvesting. Then these kernels were dried in sun for 10-12 days on the concrete floor with intermittent turning. Similarly, chali was made by harvesting mature fruits and drying it in the sun for 45 days by spreading evenly on the concrete floor. The fruits were turned over at regular intervals to ensure uniform drying and later, they were de-husked to get chali. Along with these, the fruit component analysis was also done by drawing a random sample of 10 fruits from each cultivar for characters such as fruit length (cm), fruit breadth (cm), fresh weight of the fruit, husk, kernel (g) and the dry weight of fruit, husk and the kernel (g).

Results and Discussion

Growth parameters: The growth parameters recorded during the study, such as palm height, stem diameter at 1 m height, internodal distance and the number of nodes per meter length, varied significantly among the cultivars. But the number of leaves on the crown did not show significant variation and it ranged from 9.25 to 9.67.

The cultivar SAS-1 recorded the maximum palm height (8.93 m). In contrast, cultivar Mangala (6.83 m) recorded the least palm height. This variation in the palm height among the arecanut cultivars could be attributed to their genetic makeup. Thus, from the study, it is evident that the semi-tall nature of Mangala cultivar is expressed irrespective of the growing conditions. Similar reports were made by Salvi *et al.* (1985)^[8], Ananda *et al.* (2000)^[1], Sane *et al.* (2002)^[9] and Ray *et al.* (2008)^[7].

Stem diameter was reported to be maximum in SAS-1 (17.85 cm) and it was minimum in Mangala (13.08 cm). The variation in stem diameter among the cultivars might be attributed to the genetic makeup. The classification of palms made by Long (1993)^[6], revealed that the tall varieties showed thick stem as compared to the dwarf. Similar observations were also made by Ananda *et al.* (2000)^[1], Sane *et al.* (2002)^[9] and Ray *et al.* (2008)^[7].

The internodal distance was maximum (17.35 cm) in SAS-1 and it was minimum (11.76 cm) in cultivar Mangala. Whereas, the highest number of nodes per meter length was observed in cultivar Mangala (8.64) and it was lowest in SAS-

1 (5.77). This wide variation in the number of nodes per meter length could be attributed to the variation in the internodal distance. The observations were in agreement with the findings of Ananda *et al.* (2000)^[1] and Ray *et al.* (2008)^[7].

Yield parameters: Significantly the highest fresh bunch yield per palm was obtained in Mohit Nagar (20.25 kg) and minimum yield was obtained in SAS-1 (11.64 kg) (Table 2). The kalipak yield per palm was highest in Thirthalli local (2.84 kg) and lowest in Mangala (1.79 kg). Significantly maximum chali yield of 3.30 kg/palm was recorded by Thirthalli local and the lowest yield of 2.24 kg/palm was obtained in Sumangala. The result indicated the better adaptability of Thirthahalli local to the region than any other cultivars. The findings are in corroboration with the results obtained by Ray *et al.* (2008)^[7] where, the local arecanut cultivar outperformed the released varieties for processed nut yield.

Fruit component analysis: The data on fruit component analysis revealed that the fruit length and fruit breadth were maximum in Mangala (5.77 cm) and SAS-1 (4.32 cm), respectively. The fruit length and breadth were recorded lowest in Sagar local (4.44 cm) and Thirthahalli local (3.27 cm), respectively. Both fresh weight (44.68 g) and dry weight (13.41 g) of fruit were highest in cultivar Mangala and it was lowest in Tarikere local (22.58 g and 7.45 g, respectively). The cultivar Mohit Nagar (28.63 g) recorded maximum husk fresh weight and it was minimum in Tarikere local (12.73 g). The maximum husk dry weight of 5.54 g was observed in Mangala, whereas the husk dry weight was lowest in Thirthahalli local (2.71 g). As the kernels are the economic part in arecanut, the fresh kernel weight was highest in SAS-1 (18.38 g) and lowest in Tarikere local (9.85 g). Similarly, the higher kernel dry weight was noticed in Mangala (7.86 g) and it was lowest in Tarikere local (4.16 g) cultivar. This wide variation in the fruit characters could be attributed to the genetic make-up of different arecanut cultivars under the study. Such variations in the fruit characteristics were also reported by Sane *et al.* (2002)^[9] and Chandrashekar and Bhattacharjee (2019)^[5].

Conclusion

Thus, the study revealed that the growth and yield performance of arecanut cultivars vary with the region of cultivation. Under Thirthahalli condition the growth performance of SAS-1 was superior than all other arecanut cultivars. The bunch yield per palm was highest in Mohit Nagar. As kalipak and chali are products of economic importance, the Thirthahalli local cultivar has recorded the maximum yield of these two products.

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Table 1: Growth parameters of 10 year old arecanut cultivars

Cultivars	Palm height (m)	Stem diameter (cm)	Internodal distance (cm)	Number of nodes	Number of leaves
Thirthahalli local	7.17	15.49	17.06	5.91	9.33
Sagara local	7.59	17.09	16.40	6.14	9.50
Tarikere local	8.13	16.31	14.68	6.83	9.25
SAS-1	8.93	17.85	17.35	5.77	9.67
Mangala	6.83	13.08	11.76	8.64	9.58

Sumangala	7.10	14.26	15.89	6.31	9.33
Sreemangala	7.91	16.43	15.53	6.45	9.67
Mohit Nagar	7.73	14.61	16.44	6.10	9.67
S.Em ±	0.25	0.57	0.77	0.35	0.14
C.D. @ 5%	0.74	1.73	2.34	1.06	NS

Table 2: Yield data of 10 year old arecanut cultivars

Cultivars	Fresh bunch yield (kg/palm)	Kalipak yield (kg/palm)	Chali yield (kg/palm)
Thirthahalli local	17.99	2.84	3.30
Sagara local	13.24	2.18	2.31
Tarikere local	15.94	2.40	2.74
SAS-1	11.64	2.07	2.70
Mangala	14.77	1.79	2.28
Sumangala	14.58	1.89	2.24
Sreemangala	17.09	2.30	2.74
Mohit Nagar	20.24	2.48	3.09
S.Em ±	1.65	0.12	0.16
C.D. @ 5%	4.99	0.38	0.47

Table 3: Fruit component characters of different arecanut cultivars

Cultivars	Fruit length (cm)	Fruit breadth (cm)	Fresh weight (g)			Dry weight (g)		
			Fruit	Husk	Kernel	Fruit	Husk	Kernel
Thirthahalli local	4.87	3.27	24.01	13.85	10.16	7.68	2.71	4.97
Sagara local	4.44	3.85	29.85	17.99	11.86	8.96	3.91	5.05
Tarikere local	4.79	3.42	22.58	12.73	9.85	7.45	3.29	4.16
SAS-1	4.70	4.32	37.91	19.53	18.38	11.75	3.93	7.82
Mangala	5.77	3.76	44.68	28.07	16.62	13.41	5.54	7.86
Sumangala	5.46	3.54	33.22	19.40	13.82	10.26	4.48	5.78
Sreemangala	5.51	3.97	40.28	25.28	15.00	12.77	5.79	6.98
Mohit Nagar	5.71	4.17	42.75	28.63	14.13	13.08	5.49	7.59
S.Em ±	0.26	0.13	2.13	1.96	0.77	0.68	0.51	0.63
C.D. @ 5%	0.79	0.39	6.47	5.96	2.33	2.05	1.54	1.90

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