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Production and marketing management of arecanut in Karnataka

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Abstract
The arecanut palm (*Areca catechu* L.,) is a significant commercial and business crop of India. It plays an important role in the political, social and cultural functions and the economic life of people in our country. The area under arecanut is around 12.26 Lakh hectares with a production of around 17.96 lakh tons in India. Karnataka and Kerala together account for 70-80 percent of area and production of arecanut. In Karnataka, around 2.15 lakh hectares are under arecanut cultivation. At the first stage, the random sampling method was used to select of arecanut growers. Six villages were chosen from each major producing talukas and four farmers from each village were chosen for the study, thus a total of 192 arecanut farmers were selected. Five traders, five wholesalers, five pre harvest contractors and five retailers were chosen from each of the district's and two major talukas. One arecanut processing unit was selected in from each selected district. Thus, the total sample size was 360. The growth in area, production and productivity of arecanut over a period of time revealed large fluctuation because of deficiency and improper distribution of rainfall in the study area. The cost of cultivation of arecanut, the variable cost accounted 80.75 percent of the total cost in which the wages for human labour formed the maximum share of 31.99 percent. The processing cost of arecanut was observed quit high per quintal which was much higher than procurement. Lack of labour and high cost of labour was the major problem in arecanut cultivation. Hence, increase in mechanization may help to perform the operation including harvesting.

Keywords: Investment pattern in arecanut plantation, cultivation, cost of production, net present value

Introduction
The arecanut palm (*Areca catechu* L.,) is a significant commercial and business crop of India. It plays an important role in the political, social and cultural functions and the economic life of people in our country. The arecanut has spreading its uses in Ayurvedic and veterinary medicines of animals. Arecanut in our traditional country, which is growing in large quantity in many countries like India, Malaysia, Sri Lanka, Indonesia, Philippines and some of the Pacific Islands. The economic production of arecanut is called "betel nut" and is used mainly for masticator purposes by the people of India. The raw kernel is chewed by Indian population in tender, ripe or processed form. It is processed and used into panmasala, gutkha, scented supari etc. are some treated which are become more popular in the country. The cultivation of arecanut production can be traced back to Vedic periods, where we can see the use of it.

Arecanut has been of got much importance in the life of Indians since pre-vedic times of this traditional country. This practice of having 'Tambula' as it is described in the Vedic literature has been as ancient period of the Indian civilization itself. In the literature of Tantric period that is shown that followed the Vedic period, there are some evidences to show that arecanut began to occupy a very prominent place in the religious ceremonies of some religions such as child birth, marriage, nuptial ceremonies and extending hospitality to guests of our culture. It is a common practice of Indians, even today in Hindu religious ceremonies to offer two betel leaves for guests and one betel nut with that is called as 'Tambula' with the image of God during worship. Further, arecanut has many medicinal properties for the people, chewing arecanut is said to have as one of the tonic effect on the body and it is expected to have nerve system stimulating and Ayurvedic properties. Hence, it is chewed after a sumptuous lunch is good for health conscious and after dinner. It aids for the digestive system due to these qualities of 'Tambula'.

Global scenario of arecanut
The total production of arecanut at global level was 17.96 lakhs tonnes from an area of 12.26

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lakh hectares in 2019-20. Across different countries, India is in first position with respect to area (43.01%) followed by Bangladesh (33.00%), Indonesia (11.27%) and Myanmar (5.71%). Similarly, with respect to the production also India ranked first (50.37%) followed by Bangladesh (18.27%), Myanmar (11.31%) and Indonesia (7.37%). Further, arecanut also cultivated in small scale in some countries like Nepal, China, Shri Lanka and Malaysia. The average productivity of arecanut at world level stood at 14.60 q/ha. Among different arecanut growing countries, Sri Lanka stood first with a productivity of 35.14 q/ha followed by Nepal was (33.10 q/ha) and Myanmar (29.00 q/ha). Although, India stands first in global production, its performance in productivity is poor with its global ranked 7th in terms of productivity with productivity level of 17.15q/ha which considered almost on par with world productivity level (FAO 2019-20).

Indian scenario of arecanut
In India, arecanut crop has been cultivating from time memorial with traditional cultivation techniques and one of the biggest traditional areca-growing countries in the world level. Arecanut is a major and commercial plantation crop cultivated in Peninsular and Eastern India. It is believed that India is its center of origin of universe for its cultivation. India being the biggest producer of arecanut resumed the position of *numerouno* in terms of arecanut production in the world. The arecanut cultivation is lifeline for more than 10 million populations in India as they are depending on it for their livelihood. The standard of living of the farmers engaged in arecanut cultivation is determined on the basis of area under its cultivation, its productivity and income generated from it. Further, it is presumed that cultivation of arecanut helps in developing the richness of the surrounding areas.

Methodology
Sampling procedure and design
To full fill the specific objectives, the study was conducted in Karnataka state. For selection of farmers, traders, wholesalers, retailers and pre-harvest contractor a simple random sampling method was employed. The arecanut processors were also selected using simple random sampling method. The developmental agencies also selected for the study in the selected districts.

Selection of the districts
Dakshina Kannada, Chikkamagaluru, Davanagere and Shivamogga districts were selected based on highest area and production in the state, since these four districts were accounted for 64.45 percent of area and 56.87 percent of production under arecanut in the states during the year 2018-19 also the processing units are concentrated in these arecanut producing districts.

Selection of the talukas
Arecanut is grown in all talukas of selected districts. In order to select the major arecanut growing talukas was selected based on highest area and production of arecanut. In Dakshina Kannada district was Belthangady and Bantwal taluka were selected for the study. In the Shivamogga district were Bhadravathi and Shivamogga taluka were selected for the study. Based on area and production in Davanagere district

Channagiri and Davanagere talukas were selected. Based on area and production Tarikere and Kadur taluka were selected from the Chikkamagaluru district.

Selection of the farmers and market intermediaries
At the first stage, the random sampling method was used to select of arecanut growers. Six villages were chosen from each major producing talukas and four farmers from each village were chosen for the study, thus a total of 192 arecanut farmers were selected. Five traders, five wholesalers, five pre harvest contractors and five retailers were chosen from each of the district's and two major talukas. One arecanut processing unit was selected in from each selected district. Thus, the total sample size was 360.

Result and Discussions
Investment pattern in arecanut plantation
Investment pattern in arecanut plantation in the study area is depicted in Table1. As it can be observed from the table, there are four different components were materials cost, labour cost, total initial investment and total maintenance cost during gestation period for hectare of arecanut plantation. In pooled together, under the category of material cost charges to dig bore well and electricity services accounted of ₹ 1,21,322.03 (17.64%) and barbwire and poles ₹ 37,871.78 (5.51%). The total material cost summed up to ₹ 2,17,696.27 (31.65%). The labour cost for land preparation accounted for ₹ 8,054.96 (1.17%), layout preparation and digging, planting and filling ₹ 21,796.58 (3.17%). All together the total labour cost incurred was ₹ 47,109.96 (6.85%). The total initial investment cost, combination of the material cost and labour cost ₹ 2,64,806.23 (38.50%). The costs that are incurred for maintaining the arecanut orchard during the gestation period was ₹ 48,294.40 (7.02%) during first year, ₹ 76,197.87 (11.08%) during second year, ₹ 61,438.47 (8.93%) during third year, ₹ 73,159.83 (10.64%) during fourth year, ₹ 86,978.90 (12.65%) in fifth year and ₹ 76,945.47 (11.19%) during sixth year. The total maintenance cost during the gestation period was ₹ 4,23,014.96 (61.50%). The total establishment cost including all the components was ₹ 6,87,821.19. Arecanut is a perennial crop which produces yield up to 45-50 years. The investment of arecanut during the zero years was on bore well, drip irrigation, sprayer, cleaning and land preparation, nursery, planting material and planting. The cost of establishing an arecanut garden up to bearing period was treated as establishment cost. For establishment arecanut garden investment has to be made on land preparation, planting, planting material, fencing, land rent, land revenue, fertilizers, weeding, etc. From the table 1 it could be seen that the cost of establishing of arecanut garden was high value of ₹ 6,87,821.19 compared to other horticultural crops grown in the study area. It was mainly because of the high cost of FYM, red earth, planting material and was more use of fertilizer and weedicides. The higher initial investment was also due to the cost incurred on borewell, cleaning and land preparation was very high because of the use of machine labour and human labour and also due to presence of dense forest and slope of land. Similar findings were revealed in the study of Kerutagi and Rajesh (2012) [6].

Table 1: Investment pattern in arecanut plantation by respondents

(₹/ha)

Sl. No	Particulars	Units	Davanagere Quantity	Davanagere Value	Shivamogga Quantity	Shivamogga Value	Chikkamagaluru Quantity	Chikkamagaluru Value	Dakshina Kannada Quantity	Dakshina Kannada Value	Pooled together Value	Percent total
A	**Materials cost**											
1	Bore well and electricity services	Nos	1	1,27,650.00	1	1,19,250.00	1	1,35,462.30	1	1,02,925.82	1,21,322.03	17.64
2	Barbwire and poles		-	32,500.00	-	41,300.50	-	38,900.00	-	38,786.60	37,871.78	5.51
3	Sprinkler cost and Irrigation materials/ drip irrigation cost		-	15,500.00	-	28,000.00	-	28,500.00	-	12,500.00	21,125.00	3.07
4	Planting materials	Nos	1342	11,407.00	1408	12,531.20	1414	1,16,65.50	1248	8,923.20	11,131.73	1.62
5	Farm Yard Manure (FYM)	Tonnes	16.1	18,100.00	14.05	17,589.00	15.85	14,598.00	15.31	17,982.00	17,067.25	2.48
6	Red earth	Load of tractor	31.5	9,135.00	30.75	8,763.75	31.42	9,740.20	30.25	9,075.00	9,178.49	1.33
	Total material cost			21,4292.00	1.00	2,27,434.45	1.00	2,38,866.00	1.00	1,90,192.62	2,17,696.27	31.65
B	**Labour cost**											
7	Land preparation	Hrs	8.07	7,263.00	8.75	8,120.00	8.2	7,667.00	10.68	9,169.84	8,054.96	1.17
8	Layout preparation and Digging, planting and filling	Nos	1342	24,961.20	1408	24,794.88	1414	20,644.40	1248	16,785.60	21,796.52	3.17
9	Fencing (Digging and filling of poles and barbwire)		-	18,500.00	-	15,403.33	-	21,450.60	-	13,680.00	17,258.48	2.51
	Total labour cost			50,724.20		48,318.21		49,762.00		39,635.44	47,109.96	6.85
C	Total initial investment (A+B)			2,65,016.20		2,75,752.66		2,88,628.00		2,29,828.06	2,64,806.23	38.50
	Maintenance cost of arecanut plantation during gestation period											
	1st year			44,429.92		48,826.23		45,991.69		53,929.78	48,294.40	7.02
	2nd year			67,692.81		79,777.98		75,315.81		82,004.90	76,197.87	11.08
	3rd year			57,587.74		58,679.30		59,568.38		69,918.47	61,438.47	8.93
	4th year			67,482.13		64,649.81		66,147.99		76,477.94	73,159.83	10.64
	5th year			85,363.59		90,207.14		90,962.19		99,264.15	86,978.90	12.65
	6th year			93,314.05		67,956.67		69,753.06		76,758.12	76,945.47	11.19
D	Total maintenance cost			41,5870.22		41,0097.13		40,7739.13		4,58,353.36	4,23,014.96	61.50
	Total establishment cost (C+D)			6,80,886.42		6,85,849.79		6,96,367.13		6,88,181.42	6,87,821.19	100.00

Input utilization of arecanut

Table 2 presents the input utilization pattern in arecanut plantation in the study area. For a hectare of land the seedlings that were required at 1,354 during first gestation period, for gap filling 93 seedlings in second year and 31 seedlings during third year. With respect to fertilizers that were NPK, the requirement of Nitrogen fertilizer during first year was 49.50kgs followed by 157.25kgs in the sixth year. From seventh year onwards of establishment of arecanut plantation 158.45 kgs of fertilizer was required. The requirement of Phosphorus fertilizer happened to be 23.90 kgs during first year which was followed 69.45kgs till sixth year. From seventh year onwards 70.45kgs of fertilizer was required for one hectare of arecanut plantation. With respect to potash fertilizer, for the first year the requirement of fertilizer was 71.50kgs in first year followed by 216.45 kgs of potassium fertilizer till sixth year. After sixth year the requirement of the fertilizer was 219.51 kgs per hectare of land. The requirement of farm yard manure was 16.10 tonnes during first year followed by 21.06 tonnes in sixth year. Further requirement accounted for 23.35 tonnes. The requirement of plant protection chemicals happened to be 1.05 kgs in third year and 1.78kgs in sixth year. With respect to the growth regulators, 4.50 liters were required during first year and followed by 6.40 liters till sixth year. Around 3.80 liters of herbicides were required during third and fifth year as well as from seventh year onwards in order to utilize for the orchard. The requirement of red earth was also required with

32.68 of tractor load during first year and 25.61 of tractor load from seventh year onwards. In case of lime, from fifth year requirement was 51 kgs and at last the micronutrients accounted for 47.84 kgs in third year which was followed by and 51.25kgs till sixth year of establishment. From seventh year onwards the need of micronutrient was 57.63 kgs.

Table 2 presents the input utilization pattern in arecanut plantation in the study area. The requirement seedlings were more during the initial plantation stage and the requirement for seedling was required only up to second and third year. During second and third year the seedlings were required to replace the one which were failed to germinate due to over water logging or little water supply. Apart from that it might be due to lack of oxygen or lack of moisture content or any other problems pertaining. Among the fertilizers, the requirement of potassium fertilizer was more even after the gestation period as about 20 to 25 percent was required which

was followed by nitrogen at 10 to 15 percent and potassium for the good growth of plant. The requirement of farm yard manure was required during the initial stage that was during first year, thereafter during fourth and sixth year. Majority of farmers are applying once in two years or three years. The requirement of plant protection chemicals which was in the liquid form required during gestation period and powdery form after the gestation period approximately around two kgs per hectare of land. The requirement of growth regulators was required during gestation period with the range of four to six kilograms. The majority of respondent farmers opined that silt was important as it restored soil fertility from time to time. The frequency of application of silt differed from person to person. Majority of farmers preferred to apply once in one or two years, while some farmers preferred applying once in 3 or 5 years.

Table 2: Input utilization pattern in arecanut plantation in the study area

(per ha)

Sl. No.	Inputs		Units	I year	II year	III year	IV year	V year	VI Year	7th year onwards
1	Seedlings		No.	1354	93	31	-	-	-	-
2	Fertilizers	N	Kg	49.50	91.60	148.30	156.24	156.24	157.25	158.45
		P	Kg	23.90	42.25	60.25	68.42	68.42	69.45	70.45
		K	Kg	71.50	131.60	201.42	215.89	215.89	216.45	219.51
3	FYM		tonnes	16.10	-	-	20.13	-	21.06	23.35
4	PPC		l	0.54	0.72	0.79	0.81	0.83	0.89	-
			Kg	-	-	1.05	1.75	1.63	1.78	2.51
5	Growth regulators		l	4.50	4.80	5.20	5.80	6.10	6.40	-
6	Herbicides		l	-	-	3.80	-	3.80	-	3.80
7	Red earth		tractor load	32.68	-	-	-	-	-	25.61
8	Lime		Kg	-	-	-	-	51	51.25	70.85
9	Micronutrients		Kg	-	-	47.84	52.27	55.85	55.60	57.63

Labour utilization in arecanut cultivation

Labour utilisation pattern in arecanut plantation in the study area is presented in table 3. It was evidenced that the human labour in man days for gap filling for the second and third year was 2.51 and 1.80 respectively. For application of manures, fertilizer and micronutrient the requirement of human labour was 22.50 human labours during first year, followed by 8.81 human labours, 8.88 human labours, 22.50 human labours, 8.88 human labours and 22.58 human labours till sixth year. From seventh year the need of human labour approximated to be 23.80 human labours. For the application of plant protection chemicals, the requirement of human labour was 2.91 human labour man days during first year and from seventh year onwards the need was 4.92 human labours man days. In order to spray herbicides, the requirement of the human labour was 2.60 human labours and 2.81 human labours in third and fifth year. From seventh year onwards it accounted for the requirement of 3.10 human labours. The inter cultivation of other crops was 2.12 human labour for third and seventh year onwards. Along with the human labour there was a requirement of machine labour with 8.87 hour during third year 7.50 and seventh year onwards there was an anticipated need of 8.87 machine labour for one hectare of

arecanut land. The total requirement of human labour was 56.95 man days during first year, 46.84 human labour in second year, 67.84 human labour during third year, 60.25 human labour during fourth year, 50.03 human labour during fifth year and 60.84 human labour during sixth year, The total human labour from seventh year onwards was 90.78 human labour. With respect to the machine labour, from third year there was a requirement 8.87 hours followed by 8.87 in sixth year. From seventh year onwards there was a requirement of 8.87 hours of machine labour as observed from the table. The table 3 presents labour utilization pattern in arecanut plantation in the study area, as observed from the table requirement of labour for gap filling was required during second and third year of gestation period. For application of plant protection chemicals and herbicide the requirement of the human labour on an average accounts for 3 to 4 human labour in man day. The major requirement of labour was observed for irrigation purpose, at the time of harvesting and application of manures and fertilisers. Along with the labour requirement there was a need of machinery for the cultivation purpose of arecanut for which it was observed on an average of 8.87 machine labour hours. The similar findings were observed in the study Karunakaran (2017) [5].

Table 3: Labour utilization pattern in arecanut plantation in the study area

(Per ha)

Sl. No.	Activities	Units	I year	II year	III year	IV year	V year	VI Year	7th year onwards
1.	Gap filling	HL	-	2.51	1.80	-	-	-	-
2.	Manures, fertilizer and micro nutrients application	HL	22.50	8.81	8.88	22.50	8.88	22.58	23.80
3.	Plant Protection Chemicals application (PPC)	HL	2.91	2.98	3.88	3.91	4.35	4.51	4.92
4.	Herbicide application	HL	-	-	2.60	-	2.81	-	3.10
5.	Red earth application	HL	-	-	17.99	-	-	-	23.80
6.	Inter cultivation	HL	-	-	2.12	2.12	2.12	2.12	2.12
		ML	-	-	8.87	7.50	8.88	8.87	8.87
7.	Irrigation	HL	24.30	25.60	25.45	26.60	26.75	26.50	24.84
8.	Drainage channel	HL	5.12	5.12	5.12	5.12	5.12	5.12	8.20
9.	Harvesting, Collection and Handling	HL	-	-	-	-	-	-	24.75
	Total Human labour	HL	56.95	46.84	67.84	60.25	50.03	60.84	90.78
	Total Machine labour	ML	-	-	8.87	7.50	8.88	8.87	8.87

HL-Human labour in man days, ML-Machine labour in hours

Cost of cultivation of arecanut plantation during bearing period

Cost of cultivation of arecanut plantation during bearing period in study area for hectare of land was presented in Table 4. As it was evidenced from the table for the districts Davanagere, Shivamogga and Chikkamagaluru was calculated for the arecanut rashi and chali the Dakhsina Kannada district was done for the arecanut. With respect to the rashi type which was pooled together the cost for farm yard manure accounted for ₹. 46,499.70 (16.35%). The cost that was incurred towards the micronutrients was ₹. 7,776.63 (2.73%), plant protection chemicals ₹. 19,519.82 (6.86%), herbicide ₹. 1,845.22 (0.65%), agriculture lime ₹. 698.04 (0.25%) and for poultry manure ₹. 10,133.33 (3.56%). The total material cost accounted for ₹. 1,33,261.81 (46.85%). The cost was incurred for application of these inputs, for the application of farm yard manure happened to be ₹. 10,986.64 (3.86%), for plant protection chemicals ₹. 6,303.01 (2.22%), for irrigation purpose ₹. 11,116.01 (3.91%), red earth application ₹. 8,266.37 (2.91%), herbicide application. The total labour cost was incurred during entire process accounted of ₹. 85,519.85 (30.07%). The total variable cost was summed up to ₹. 2,34,096.38 which had a share of 82.31 percent among all. The table also depicts the cost incurred towards the fixed cost, for amortised establishment cost ₹. 13,754.02 (4.84%), rental value of the land ₹. 26,876.33 (9.45%), land revenue ₹. 173.73 (0.06%), depreciation ₹. 4,131.67 (1.45%). The total cost that was incurred happened to be ₹. 2,84,424.42.

The table also depicts the cost incurred for the cultivation of rashi that was cultivated in Dakshina Kannada district. The cost was incurred for the purchase of inputs was calculated for the purchase of farm yard manure accounted for ₹. 47,139.45 (18.32%), for the fertilisers ₹. 14,650.84 (5.69%). As it can be observed for the Rashi variety of arecanut, the total cost was ₹. 2,84,424.42, the total yield was obtained from one hectare of land of cultivation was 128.75 quintals of raw arecanut. The average price of arecanut in the market was ₹. 5,428.60 per quintal. With respect to the gross return was obtained from the yield was ₹. 6,98,932.25 and net return to be ₹. 4,14,507.83. The table also presents the yield and returns for the chali the cost of cultivation accounted for ₹. 2,60,691.03 with a yield of 116.50 quintals of raw arecanut for a hectare of land. The average price of the chali variety in the market was ₹. 4,980.00. The gross returns that is obtained to be ₹. 5,80,170.00 and net returns ₹. 3,19,478.97. The average yield obtained per hectare in case of Rashi arecanut

was 128.75 quintal per hectare and Chali was 116.50 quintal per hectare. Arecanut weight and harvesting time, in rashi arecanut the harvesting was tender nut while in chali verities during ripened. However, it varies considerably from locally to locality depending upon the cultural practices adopted by the cultivation. The average returns obtained from arecanut plantation were ₹. 6,98,932.25 in case of Rashi and in case of chali ₹. 5,80,170 through the arecanut confined to a limited area, demand for this nut spread throughout country. One of the main reasons are better price in arecanut in study area. The total production cost of rashi arecanut was ₹. 2,84,424.42 and in case of Chali ₹. 2,60,691.03. Average net returns over the cost of production were ₹. 4,14,507.83 in case of Rashi arecanut and in case of Chali ₹. 3,19,478.97. Similar results associated with Roopan et al. (2015) [10] and Aditya et al. (2017) [1].

From the table 5 presents the marketing cost incurred by the stakeholders in different marketing channels of sale of one quintal of Rashi variety of arecanut. In the marketing channel-I the marketing costs incurred by the pre harvest contractors, the total cost that was acquired was ₹. 429.36. With respect to traders that total cost that was incurred during entire transaction process was ₹. 556.03. The wholesaler incurred the costs with total cost incurred to be ₹. 599.22. The last intermediary in the marketing channel was retailer, the retailer incurred a total marketing cost higest of ₹. 1029.50 per quintal. In the marketing channel-II the marketing costs incurred by the farmers, the total cost acquired was ₹. 510.03. With respect to cooperative societies the total cost that was incurred during entire transaction process is ₹. 455.46. The wholesaler incurred the total cost was ₹. 542.55. The last intermediary in the marketing channel was retailer, the retailer incurred a total marketing cost of ₹. 1031.18 per quintal of marketed costs. In the marketing channel-III the marketing costs incurred by the farmers, for transportation charges ₹. 112.50, followed by storage losses accounted for ₹. 268.50 and cleaning and sorting charges of ₹. 58.96. The total cost acquired was ₹. 558.92. With respect to traders the charges that they incurred were for the total cost that is incurred during entire transaction process was ₹. 583.28. The wholesaler incurred the costs with ₹. 602.69. The last intermediary in the marketing channel was retailer, the retailer incurred a total marketing cost of ₹. 1025.50 per quintal of marketing cost. The result of marketing cost incurred by different stakeholders in marketing channels for rashi and chali arecanut is depicted in table 5. As it is observed from the

table, under all the marketing channels were studied, the maximum marketing cost incurred by the retailers which was followed by wholesalers, traders, pre-harvest contractors, farmers, cooperative societies. Almost all the stake holders faced the loss of quantity of the arecanut during storage which was due to the broken of the nuts etc. to the arecanut. Among all the stakeholders the retailers marketing cost was found to be high as they are the last stake holder before the product reaches the ultimate consumer. The similar findings were observed in the study Jolly Devi (2015) [4].

Table 6 presents the marketing cost, margin, price spread and marketing efficiency in marketing of Rashi arecanut in different channels. There were three identified marketing channels for the sale of arecanut. Under the channel-I, the gross price received by the producer was ₹. 38,760.20 per quintal of net price received by the producer was same. The preharvest contractor purchases the arecanut at the price ₹. 38,760.20 and the marketing cost was incurred ₹. 429.36 and profit margin of ₹. 7,699.04. The selling price was ₹. 46,888.60 to traders. The marketing cost was incurred by the retailer during the sale process was ₹. 1,029.50 and the margin that was retained after the sale of the arecanut was ₹. 5,858.58 with the selling of arecanut to the consumer at ₹. 58,580.60. The total marketing cost was incurred during the entire process was ₹. 2,614.11 and the profit margin to be ₹. 17,206.29. The price spread was around ₹. 19,820.40 with the producer share in consumer rupee to be 66.17 percent with the marketing efficiency as per the Acharyas approach of 1.96. Under the marketing channel-II, the gross price revived by the producer was ₹. 46,992.60 for a quintal of arecanut of which the marketing cost was incurred by the producer were ₹. 510.03. The net price received by the producer was ₹. 46,482.57. The purchase price of the arecanut by the cooperatives by the farmer was ₹. 46,992.60 of which the marketing cost incurred was ₹. 455.46 with the net profit margin of ₹. 1,375.10 per quintal of arecanut. The cooperative society's sale price to the wholesaler was ₹. 48,823.16 and the wholesaler spends ₹. 542.55 on the marketing costs. The profit that the wholesaler retains after the sale of the produce to the retailer was ₹. 2,422.89 with the sale price of ₹. 51,788.60. The retailer incurs the marketing cost of ₹. 1031.18 by having the marketing margin of ₹.

6,185.82 per quintal. The sale price of the arecanut to the end user consumer was ₹. 59,005.60 per quintal. The overall marketing cost was incurred during entire process was ₹. 2,539.22 and the marketing margin was ₹. 9,983.81. The price spread was ₹. 12,013.00 and the producer share in consumer rupee accounted for 78.78 percent. The marketing efficiency according to acharyas approach was 3.71. The table also depicts the various cost that are incurred in the marketing channel-III, the gross price received by the producer was ₹. 46,992.60 of which the marketing cost was ₹. 558.92 per quintal. Upon sale to the trader the net price received by the farmer was ₹. 46,433.68 per quintal. The marketing cost was incurred by the trader during the sale of the arecanut to the next intermediary was ₹. 583.23, the net profit that retained by the trader was ₹. 1,222.35 with the selling price of ₹. 48,798.20 to the retailer. The retailer incurred a marketing cost of ₹. 1,025.50 in selling to the consumer with the retaining of ₹. 6,087.40 per quintal as net profit margin. The ultimate sale price to the end user was ₹. 58,901.59 per quintal. The total marketing cost that was incurred during this marketing channel was ₹. 2,770.39, profit to be ₹. 9,697.52 and price spread was ₹. 11,908.99. The producer share in consumer rupee was 78.83 percent with the marketing efficiency of 3.72 respectively.

The presents marketing cost, marketing margin, price spread and marketing efficiency in marketing of arecanut in different marketing channels. The different stake holders who were involved in marketing of the arecanut were producers, pre-harvest contractor, cooperative societies, traders, wholesalers and retailers. With respect to the price spread, high value of price spread was observed in marketing channel-I and same amount was observed for other two marketing channels was channel-II and channel-III. The producer share in consumer rupee was high in case of marketing channel-II and marketing channel-III indicating the farmer can opt for these channels as compared with the marketing ₹ channel-I. The acharyas approach of marketing efficiency indicated the existence of high efficiency of marketing for channel II and channel-III when compared with the channel-I. The overall results obtained for both the arecanut verities that were rashi and chali were on par with the results of Ram Singh and Feroze in the year 2018.

Table 4: Cost of cultivation of arecanut plantation during bearing period in study area

(₹/ha)

Sl. No.	Varieties		Red Boiled Type (Rashi)							White Chali Type		
	Districts		Davanagere		Shivamogga		Chikkamagaluru		Pooled together		Dakshina Kannada		
	Particulars	Units	Quantity	Value (₹)	Quantity	Value (₹)	Quantity	Value (₹)	Value (₹)	%	Quantity	Value (₹)	%
1.	FYM	Tonnes	21.33	42,700.00	23.23	45,298.50	25.16	51,500.60	46,499.70	16.35	23.71	47,139.45	18.32
2.	Fertilizers			26,617		20,867		17,262.50	21,582.16			14,650.84	
3.	Micronutrients	Kg	60.39	7,246.80	65.20	7,980.50	67.69	8,102.60	7,776.63	2.73	60.42	82,56.36	3.21
4.	Plant Protection Chemicals	-	-	15,800.00	-	20,859.36	-	21,900.10	19,519.82	6.86	-	22,145.57	8.61
5.	Red earth	load	32.68	36,425.12	30.16	31,488.90	27.51	35,219.35	34,377.79	12.09	18.75	16,961.81	6.59
6.	Herbicide	liter	3.10	1,788.81	3.25	1,825.60	3.50	1,921.25	1,845.22	0.65	3.55	1,902.50	0.74
7.	Agriculture Lime	Kg	18.50	120.25	140.80	844.80	180.65	1,129.06	698.04	0.25	131.25	813.75	0.32
8.	Poultry manure	No of bags	-	-	-	-	93.84	10,133.33	10,133.33	3.56	-	-	
A	Total material costs			1,23,451.98		1,29,164.66		1,47,168.79	1,33,261.81	46.85		1,11,870.28	43.48
9.	Application of FYM, fertilizers and micronutrients	MD	23.80	10,995.60	24.75	11,261.25	20.88	10,703.08	10,986.64	3.86	27.60	11,332.56	4.40
10.	Application of Plant Protection	MD	10.05	6,442.23	10.62	6,478.20	9.70	5,988.60	6,303.01	2.22	11.40	6,010.42	2.34

No.	Particulars	Unit											
	Chemicals												
11.	Irrigation	MD	24.84	11,077.40	21.53	10,756.39	26.50	11,514.25	11,116.01	3.91	31.75	12,887.33	5.01
12.	Red earth application	MD	18.50	8,251.00	19.98	8,324.87	18.50	8,223.25	8,266.37	2.91	18.06	7,330.55	2.85
13.	Herbicide application	MD	2.50	1,522.50	3.12	1,903.20	3.20	1,829.44	1,751.71	0.62	3.27	1,493.74	0.58
14.	Harvesting cost			22,052.63		21,051.84		22,588.63	21,897.70	7.70		20,458.62	7.95
15.	Inter cultivation	ML	6.88	6,134.56	7.02	6,324.61	6.98	6,244.72	6,234.63	2.19	8.00	7,116.80	2.77
16.	Watch and ward	MD	68.43	17,109.30	67.50	23,550.75	66.25	16,231.25	18,963.77	6.67	60.28	15,672.80	6.09
B	Total labour cost (₹)			83,585.22		89,651.11		83,323.22	85,519.85	30.07		82,302.82	31.99
C.	Interest on working capital @ 7%	₹		14,492.60		15,317.10		16,134.44	15,314.72	5.38		13,592.12	5.28
II	Total variable cost (A+B+C)	₹		2,21,529.80		2,34,132.87		2,46,626.45	2,34,096.38	82.31		2,07,765.22	80.75
17.	Fixed cost												
18.	Amortized establishment cost			13,617.73		13,717.00		13,927.34	13,754.02	4.84		13,763.63	5.35
19.	Rental value of land			26,500.00		27,589.00		26,540.00	26,876.33	9.45		28,945.55	11.10
20.	Land revenue	₹		160.00		180.60		180.60	173.73	0.06		160.00	0.06
21.	Depreciation	₹		3,997.00		4,185.00		4,213.00	4,131.67	1.45		4,386.00	1.70
22.	Interest on fixed cost @12%	₹		5,312.97		5,480.59		5,383.31	5,392.29	1.90		5,670.62	2.17
II	Total fixed cost	₹		49,587.70		51,152.19		50,244.25	50,328.05	17.69		52,925.81	20.30
23	Total cost (I+II)			2,71,117.50		2,85,285.06		2,96,870.70	2,84,424.42	100.00		2,60,691.03	100.00
24.	Total cost of cultivation of arecanut	₹/ha							2,84,424.42			2,60,691.03	
25.	Total yield of raw arecanut	Q/ ha							128.75			116.50	
26.	Price of raw arecanut	Q/ ha							5,428.60			4,980	
27.	Gross returns	₹							6,98,932.25			5,80,170	
28.	Net return	₹							4,14,507.83			3,19,478.97	

Table 5: Marketing cost incurred to stakeholders in different marketing channels of arecanut

(₹. /q)

Sl. No.	Particulars	Channel-I				Channel-II				Channel-III			
		PHC	Traders	Wholesaler	Retailers	Farmers	Co-operative societies	Wholesalers	Retailers	Farmers	Traders	Wholesalers	Retailers
1.	Transportation charges	35.84	120.81	138.60	69.89	103.60	112.05	120.25	63.50	112.50	127.69	138.60	69.80
2.	Loading and unloading charges	6.82	20.33	22.60	26.98	5.25	18.13	16.38	26.50	6.20	21.50	22.50	21.60
3.	Storage cost	19.22	26.51	30.60	105.62	12.60	12.60	36.60	100.25	18.98	26.50	18.90	106.56
4.	Packing charges	90.62	78.63	94.60	126.34	93.78	79.25	92.36	132.50	93.78	79.89	95.63	128.60
5.	Market fee	-	1.60	2.10	2.75	-	1.25	2.10	2.75	-	1.60	2.30	2.75
6.	Electricity charges	9.12	8.85	12.30	14.63	-	0.98	12.30	12.60	-	8.85	14.40	14.63
7.	Storage losses	248.91	215.63	75.96	257.33	268.30	198.60	53.60	260.66	268.50	221.50	84.90	260.36
8.	Cleaning and sorting charges	18.93	35.50	78.90	145.60	26.50	32.60	65.33	152.06	58.96	37.75	78.90	148.60
9.	Rent on shop		48.25	143.56	280.36			143.63	280.36	-	58	146.56	272.60
	Total	429.36	556.03	599.22	1029.5	510.03	455.46	542.55	1031.18	558.92	583.28	602.69	1025.50

Note: PHC-Pre Harvest Contractor

Table 6: Marketing cost, margin, price spread and marketing efficiency in arecanut

(₹. /q)

Sl. No	Particulars	Channel-I	Channel-II	Channel-III
1	Producer			
a	Gross price received by the producer	38,760.20	46,992.60	46,992.60
b	Marketing cost of the producer	-	510.03	558.92
c	Net price received by the producer	38,760.20	46,482.57	46,433.68
2	Pre-harvest contractor			
a	Purchase price	38,760.20	-	-
b	Marketing cost incurred	429.36	-	-
c	Net profit margin	7,699.04	-	-
d	Selling price	46,888.60	-	-
3	Co-operative societies			
a	Purchase price	-	46,992.60	-
b	Marketing cost incurred	-	455.46	-
c	Net profit margin	-	1,375.10	-
d	Selling price	-	48,823.16	-
4	Traders			
a	Purchase price	46,888.60	-	46,992.60
b	Marketing cost incurred	556.03	-	583.28
c	Net profit margin	1,280.60		1,222.35
d	Selling price	48,725.23	-	48,798.23
5	Wholesaler			
a	Purchase price	48,725.23	48,823.16	48,798.23
b	Marketing cost incurred	599.22	542.55	602.69
c	Net profit margin	2,368.07	2,422.89	2,387.77
d	Selling price	51,692.52	51,788.60	51,788.69
6	Retailers			
a	Purchase price	51,692.52	51,788.60	51,788.69
b	Marketing cost incurred	1,029.50	1,031.18	1,025.50
c	Net profit margin	5,858.58	6,185.82	6,087.40
d	Selling price	58,580.60	59,005.60	58,901.59
7	Consumer purchase price	58,580.60	59,005.60	58,901.59
I	Total marketing cost incurred	2,614.11	2,539.22	2,770.39
II	Total profit margin	17,206.29	9,983.81	9,697.52
III	Price spread	19,820.40	12,013.00	11,908.99
IV	Producers shares in consumer rupee (%)	66.17	78.78	78.83
	Marketing efficiency			
1	Acharya approach	1.96	3.72	3.71

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