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Economics of production of arecanut in Shivamogga district of Karnataka

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ABSTRACT

Arecanut (*Areca catechu* L.) is a commercially important perennial plantation crop in Karnataka, where its cultivation supports farm income and generates demand for labour, irrigation and other agricultural inputs. The present study examines the economics of arecanut production in Shivamogga district with particular emphasis on establishment expenditure, annual cost of cultivating bearing gardens, returns and the productivity of major production resources. The analysis is based on the sampled arecanut growers covered in the study, with observations classified into small, medium and large farm-size groups. Standard cost concepts were used to estimate Cost 'A', Cost 'B' and Cost 'C', while a Cobb-Douglas production function was fitted using human labour, manure, nitrogen, phosphorus, potassium, irrigation and plant protection as explanatory variables. Resource-use efficiency was assessed through the ratio of marginal value product to marginal cost. The findings show that establishment of one hectare over four years required ₹1,94,580.72 on average, with the cost declining from ₹2,03,948.86 among small farmers to ₹1,82,034.70 among large farmers. For bearing gardens, overall Cost 'C' was ₹3,33,942.61 per hectare and output averaged 80.88 quintals. The corresponding benefit-cost ratio was 2.91, confirming the economic viability of the crop. Small farms obtained the highest physical output (82.82 quintals/ha), whereas large farms achieved the lowest Cost 'C' and the highest Cost 'C' benefit-cost ratio (3.01).

Keywords: Arecanut, Cost of cultivation, Profitability, Shivamogga

Introduction

Arecanut (*Areca catechu* L.), widely known as areca nut or betel nut, is a long-duration plantation crop with substantial economic importance in tropical Asia. In India, the crop has a particularly strong production base in the southern and north-eastern regions, with Karnataka occupying a leading position. Its importance is not confined to the marketed nut: cultivation supports farm employment, input supply, transport, processing and other allied activities. The crop also has a long-established place in social and ceremonial practices in India. The combination of commercial demand and cultural use has contributed to the persistence of arecanut-based farming systems across major producing regions. The economic characteristics of arecanut production are different from those of annual field crops because the crop requires a sizeable establishment investment and a number of years before the plantation reaches bearing stage. Once established, however, a well-managed garden can generate returns over a prolonged period. Consequently, production decisions concerning planting material, irrigation, nutrient management, labour deployment and plant protection have implications for farm profitability over several seasons. In a perennial crop of this nature, efficient use of production resources is therefore as important as the level of output itself. Karnataka provides an especially relevant setting for examining these issues. Earlier studies have documented the economic importance and profitability of arecanut cultivation in the state, including evidence from Shivamogga and other production regions (Preeti, 1998; Ramappa, 2013; Ashoka *et al.*, 2021) [2, 3, 1]. More recent work has also highlighted continuing production constraints and the need for improved farm management and technical support (Jamanal *et al.*, 2024) [4]. Against this background, a farm-level analysis of current production costs and resource productivity in Shivamogga is useful for identifying where additional expenditure can generate productive gains and where existing expenditure may be excessive.

Materials and methods

The study focused on Shivamogga district in Karnataka due to its prominence in arecanut cultivation. Within this district, the Sagara and Thirthahalli tahsils were specifically chosen because they account for the largest share of arecanut-growing area. From each of these two tahsils, three villages with the highest acreage under arecanut were selected, resulting in a total of six villages. A sample size of 90 respondents was drawn from these 6 villages for the research.

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Tools of analysis**Estimation of production costs and returns**

The production costs and returns of arecanut production were estimated on the basis of per hectare. The standard cost concept were used and viz. cost 'A', cost 'B' and cost 'C' were worked out. The

sample statistical tools viz. percentages and averages were used.

Results and discussion**Cost of cultivation of arecanut**

The per hectare cost of cultivation arecanut for various farm size groups, as well as the overall average, is presented in Table 1 (₹/ha)

Table 1. The per hectare cost of cultivation arecanut for various farm size groups, as well as the overall average, is presented

Sr.No.	Items of cost	Groups											
		Qty	I Value	I Per cent	Qty	II Value	II Per cent	Qty	III Value	III Per cent	Qty	Overall Value	Overall Per cent
1	Hired Human labour (Man days)												
	a) Male	124.10	49641.79	(13.85)	122.11	61057.35	(18.67)	121.78	60888.89	(19.24)	122.67	57196.01	(17.13)
	b) Female	30.97	10839.55	(3.02)	30.49	9147.98	(2.80)	30.49	9146.10	(2.89)	30.65	9711.21	(2.91)
2	Bullock power (pair days)	0	0	0	0	0	0	0	0	0	0	0	0
3	Manures (q)	16.72	18388.06	(5.13)	16.50	18147.27	(5.55)	16.12	17735.22	(5.61)	16.45	18090.19	(5.42)
4	Fertilizers (kg)												
	N	141.64	991.49	(0.28)	140.02	1120.19	(0.34)	139.93	1119.47	(0.35)	140.53	1077.05	(0.32)
	P	62.39	748.66	(0.21)	59.93	719.15	(0.22)	59.75	717.05	(0.23)	60.69	728.29	(0.22)
	K	192.91	7137.69	(1.99)	193.04	7142.39	(2.18)	189.91	7026.68	(2.22)	191.95	7102.25	(2.13)
5	Irrigation Charges (Rs.)		8269.48	(2.31)		6992.45	(2.14)		6662.93	(2.11)		7308.29	(2.19)
6	Plant protection charges (Rs.)		5593.28	(1.56)		4013.92	(1.23)		6179.06	(1.95)		5262.09	(1.58)
7	Incidental charges (Rs.)		1090.37	(0.30)		1039.44	(0.32)		1048.91	(0.33)		1059.57	(0.32)
8	Repairs (Rs.)		307.46	0.09		986.84	(0.30)		510.53	(0.16)		601.41	(0.18)
	Working capital (Rs.)		103007.84	(28.74)		110366.39	(33.75)		111034.85	(35.09)		108136.36	(32.38)
9	Int.on Working Capital @ 6 % (Rs.)		6180.47	(1.72)		6621.98	(2.02)		6662.09	(2.11)		6488.18	(1.94)
10	Depre. on farm implements		36315.45	(10.13)		16456.44	(5.03)		11255.76	(3.56)		21342.55	(6.39)
11	Land revenue and taxes		150.00	(0.04)		150.00	(0.05)		150.00	(0.05)		150.00	(0.04)
	Cost 'A'		145653.75	(40.64)		133594.81	(40.85)		129102.69	(40.81)		136117.08	(40.76)
12	Rental value of land		165482.84	(46.17)		160794.06	(49.17)		158573.40	(50.12)		161616.77	(48.40)
13	Int .on fixed capital @ 10 % (Rs)		9638.81	(2.69)		2003.44	(0.61)		1419.89	(0.45)		4354.04	(1.30)
14	Amortization cost (Rs)		14816.66	(4.13)		13008.12	(3.98)		13224.62	(4.18)		13683.13	(4.10)
	Cost 'B'		335592.06	(93.63)		309400.42	(94.61)		302320.61	(95.55)		315771.03	(94.56)

(continued on next page)

Sr.No.	Items of cost	Groups											
15	Family labour												
	a. Male	37.99	18992.54	(5.30)	30.49	15246.64	(4.66)	30.40	12160.76	(3.84)	32.96	15466.64	(4.63)
	b. Female	9.55	3820.90	(1.07)	7.95	2386.12	(0.73)	7.63	1907.80	(0.60)	8.38	2704.94	(0.81)
	Cost 'C'		358405.49	(100.00)		327033.18	(100.00)		316389.17	(100.00)		333942.61	(100.00)
	Output (Qtls.) and income Rs.	82.82	993797.01		80.47	965664.39		79.36	952340.43		80.88	970600.61	
	Per quintal cost		4327.71			4063.94			3986.67			4128.69	

The cost of cultivation of arecanut was estimated using standard cost concepts, including Cost 'A', Cost 'B' and Cost 'C'. At the overall level, the per hectare cost of cultivation under Cost 'C' was ₹3,33,942.61. Among the different farm-size groups, the cost was highest for small farmers at ₹3,58,405.49, followed by medium farmers at ₹3,27,033.18 and large farmers at ₹3,16,389.17 per hectare. This indicates that the per hectare cost of cultivation declined with an increase in farm size.

Under Cost 'A', the overall cost was ₹1,36,117.08 per hectare, accounting for 40.76 per cent of Cost 'C'. Hired human labour constituted an important component, with expenditure on male labour amounting to ₹57,196.01 (17.13%) and female labour to ₹9,711.21 (2.91%) per hectare. The expenditure on manures was ₹18,090.19 (5.42%), while fertilizer expenditure on nitrogen, phosphorus and potassium was ₹1,077.05 (0.32%), ₹728.29 (0.22%) and ₹7,102.25 (2.13%), respectively. Irrigation charges accounted for ₹7,308.29 (2.19%) and plant protection charges for ₹5,262.09 (1.58%) of Cost 'C'.

Under Cost 'B', the overall cost was ₹3,15,771.03 per hectare, constituting 94.56 per cent of Cost 'C'. The rental value of land was the major component, amounting to ₹1,61,616.77 and accounting for 48.40 per cent of Cost 'C'. Interest on fixed capital and amortization cost were ₹4,354.04 (1.30%) and ₹13,683.13 (4.10%), respectively.

The imputed value of family labour further increased the total cost to Cost 'C'. Overall, family male and female labour contributed ₹15,466.64 and ₹2,704.94 per hectare, respectively. Thus, the results indicate that hired human labour and rental value of land were the

major cost components, while large farmers incurred comparatively lower per hectare cultivation costs than small and medium farmers.

Costs, returns, gross income and B:C ratio from arecanut cultivation

Among small farmers, the total cost of arecanut cultivation was ₹3,58,405.49 per hectare under Cost C. The average production was 82.82 quintals per hectare, which was the highest among the three size groups. The gross income obtained was ₹9,93,840.00 per hectare. The B:C ratio was 2.77 under Cost C, indicating that arecanut cultivation was profitable for small farmers.

In the case of medium farmers, the total cost of cultivation was ₹3,27,033.18 per hectare under Cost C. The production was 80.47 quintals per hectare, while the gross income was ₹9,65,640 per hectare. The B:C ratio under Cost C was 2.95, showing that medium farmers obtained good returns from arecanut cultivation.

Among large farmers, the cost of cultivation under Cost C was ₹3,16,389.17 per hectare. The production was 79.36 quintals per hectare and the gross income was ₹9,52,320 per hectare. The B:C ratio was 3.01, which was the highest among the three farmer groups. This indicates that large farmers were able to obtain comparatively better returns in relation to the cost incurred. The benefit-cost ratio at Cost C was 2.77, 2.95 and 3.01 for small, medium and large farmers respectively, and 2.91 at the overall level, confirming that although absolute net return is broadly similar across farm sizes, the efficiency with which cost is converted into profit improves as farm size increases.

Table 2. Costs and Returns from Arecanut Cultivation (₹/ha)

Sr. No.	Particulars	Unit	Size groups			
			Small	Medium	Large	Overall
1.	Total cost					
	i) Cost 'A'	₹	145653.75	133594.81	129102.69	136117.08
	ii) Cost 'B'	₹	335592.06	309400.42	302320.61	315771.03
	iii) Cost 'C'	₹	358405.49	327033.18	316389.17	333942.61
2.	Profit at					
	i) Cost 'A'	₹	848186.25	832045.19	823217.31	834482.92
	ii) Cost 'B'	₹	658247.94	656239.58	649999.39	654828.97
	iii) Cost 'C'	₹	635434.51	638606.82	635930.83	636657.39
3.	Production	Qtls	82.82	80.47	79.36	80.88
4.	Gross income	₹	993840.00	965640.00	952320.00	970600.00
5.	B:C ratio					
	i) Cost 'A'		6.82	7.23	7.38	7.13
	ii) Cost 'B'		2.96	3.12	3.15	3.07
	iii) Cost 'C'		2.77	2.95	3.01	2.91

At the overall level, gross income was ₹9,70,600 per hectare and net return over Cost 'C' was ₹6,36,657.39. The overall Cost 'C' benefit-

cost ratio of 2.91 means that each rupee of comprehensive production

cost was associated with about ₹2.91 of gross income. The ratio was 2.77 for small farmers, 2.95 for medium farmers and 3.01 for large farmers. Thus, the enterprise remained profitable in all three groups, while profitability relative to total cost improved with farm size.

An important result is that the group with the highest physical output did not have the highest profitability ratio. Small farmers produced 82.82 quintals per hectare, but their Cost 'C' was ₹3,58,405.49 per hectare and their unit cost was ₹4,327.71 per quintal. Large farmers produced 79.36 quintals but reduced unit cost to ₹3,986.67 per quintal and achieved the highest Cost 'C' B:C ratio of 3.01. This indicates that efficiency in converting expenditure into returns was more important than maximum physical yield alone.

Conclusions

The study confirms the economic viability of arecanut cultivation across all farm-size categories in Shivamogga district, while revealing notable disparities in cost structure and productive efficiency. The average establishment cost over four years stood at ₹1,94,580.72 per hectare, with small farmers bearing the highest outlay. In bearing plantations, the overall Cost 'C' averaged ₹3,33,942.61 per hectare, yielding an output of 80.88 quintals and a gross income of ₹9,70,600, which together produced a net return of ₹6,36,657.39 and an overall benefit-cost ratio of 2.91. Notably, higher physical productivity did not ensure superior economic performance; small farmers recorded the highest yield (82.82 quintals) yet registered a lower B:C ratio of 2.77 due to elevated production costs, whereas large farmers, despite a slightly lower output (79.36 quintals), achieved a higher ratio of 3.01 through better cost management and resource organisation. These findings underscore that profitability in arecanut farming hinges more on cost efficiency and optimal resource utilisation than on yield maximisation alone.

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