Research Article

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Remunerativeness led acreage response of arecanut in Karnataka state

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Abstract

The decision of farmers regarding allocation of farm resources, in general, and land resource which have supply inelasticity is crucial. This decision of farmers in case of commercial plantation crops will be highly influenced by the policies and programmes formulated by the government. The formulated developmental programmes mainly aim at increasing the overall production of the economy and its success depends on the reactions of farmers to such programmes. The increased production can be achieved either through extensive or intensive cultivation or the mix of two. In this context it becomes imperative to have a better insight about the farmers' response to various price and non-price factors. To understand the behavioural mechanism of arecanut growers in major areca growing districts of Karnataka, Nerlovian lagged adjustment model was employed. The result revealed that it is the expected price (remunerativeness) which has resulted in extensive cultivation in most of the areca growing belts. The result was contrasting in case of Dakshina Kannada where the response of farmers to expected price was negative, which might be due to the fact that growers in this region have shifted to alternative crop *i.e*., rubber, which is equally remunerative due to wide prevalence of yellow leaf disease. The other likely reason would be the limitation of area for further expansion, since area expansion has met its saturation in the locality. To prove the remunerativeness of arecanut enterprise, representative district Shimoga was chosen. The economics of arecanut cultivation revealed that it is remunerative compared to other major crops of the study area.

Keywords: Arecanut, cost of cultivation, remunerativeness, supply response

Introduction

Karnataka is the leading producer of arecanut in the country with total production of 2.24 lakh tons from an area of 1.84 lakh ha. Arecanut enterprise in the state is important, since it contributes eight per cent to the gross state domestic product besides providing livelihood security to three million farmers of the state. The production of arecanut in the state has been increasing over the years. In this context, the supply behaviour of farmers become important to probe into aspects like, whether the increase in production is due to extensive or intensive cultivation and also the factors responsible for this increase in area and yield, which in turn contributes to the increase in the output supply. Thus, a study was made with a hypothesis that the remunerativeness of arecanut enterprise is the precursor for acreage response of arecanut in major arecanut growing districts of Karnataka and for the state as a whole.

Materials and methods

To analyse the acreage response of arecanut in Karnataka, six major arecanut growing districts *viz*., Shimoga, Dakshina Kannada, Uttara Kannada, Davangere, Chickmagalur and Tumkur were selected. The district wise time-series data for the period of 10 years (1998-99 to 2007-08) pertaining to area, production and productivity of arecanut and the average annual rainfall were collected from the Directorate of Economics and Statistics, Bangalore. Data on wholesale prices of arecanut

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were collected from Shimoga, Mangalore, Sirsi, Davangere, Tarikere and Tumkur, Agriculture Produce Market Committees (APMC), which are considered as the representative and major markets for selected districts, respectively. The analysis was restricted for ten years because of data constraints confronted due to district reformation during the study period. This district reformation has resulted in interchange of predominantly areca growing taluks from one district to another district, resulting in wide fluctuation of data pertinent to area under Arecanut, which cannot be considered as an actual acreage response. To avoid this misleading result, data pertinent to the time period after district reformation *i.e*., from 1997 was considered for the study. The average annual rainfall was considered to capture the influence of weather, since arecanut is mainly grown as a rainfed crop in predominantly areca growing districts of Karnataka. Hence this variable was considered as an appropriate surrogate for weather (Gajanana, 1985).

To assess the remunerativeness of the arecanut crop, Shimoga district was purposively selected since it has maximum area under arecanut. Multistage random sampling was followed in selection of the respondents. From the district, two taluks (Shimoga and Bhadravathi) having highest area under the crop were chosen. From each of the two sample taluks, two villages, having largest area under arecanut were again chosen. From each of the villages, fifteen farmers were randomly selected to make a total sample size of sixty farmers. Pertinent primary data were elicited from the sample farmers for the agricultural year 2009-10.

Nerlovian adjustment lag model was employed for estimating acreage response of arecanut growers for price and non-price factors. Similarly, to assess the remunerativeness, standard cost concepts of farm management was employed.

Acreage response model

$$A_t^* = a_0 + a_1 P_t^e + a_2 W_t + a_3 R_t + U_t \text{.....(1)}$$

$$(A_t - A_{t-1}) = (A_t^* - A_{t-1}) \qquad 0 < \gamma < 1 \text{.....(2)}$$

A_t^* = Desired area under arecanut in the year 't' in hectares

A_t = Actual area in hectares under arecanut in the year 't'

P^e_t = Expected price in period 't' computed as the average of previous five years annual wholesale price of arecanut.

A_{t-1} = Actual area under arecanut in the year 't-1'

W_t = Average annual rainfall in period 't'

R_t = Price risk measured by taking standard deviation of prices for the past three years

U_t = Error term

γ = Coefficient of adjustment

Since equation (1) have unobservable variable, desired areas under the crop (A_t^*). The equation could not be used for estimation. Therefore, equation (2) was substituted for (1) and algebraic manipulation led to the expression of the equation in terms of observation as under

$$A_t = b_0 + b_1 P_t^e + b_2 A_{t-1} + b_3 W_t + b_4 R_{t+} V_t \text{..... (3)}$$

$b0 = a0\ \gamma$, $b1 = a1\ \gamma$, $b2 = (1-\gamma)$, $b3 = a2\ \gamma$, $b4 = a3\ \gamma$, $b5 = a4\ \gamma$, $Vt = \gamma\ Ut$

Equation (3) was estimated using OLS. The regression model and coefficients were tested using appropriate statistical criteria. The model was also subjected for econometric tests such as multicollinearity and autocorrelation.

Short run price elasticity of supply was expressed as the ratio of the mean of prices to the mean of area multiplied by the price coefficients.

$$\text{Short run elasticity} = \frac{\text{Price coefficient x mean price}}{\text{mean price}}$$

$$\text{Long run price elasticity} = \frac{\text{Short run elasticity}}{\text{Co-efficient of area adjustment}}$$

Methodology for estimation of cost of cultivation

The estimation of 'unit' cost of cultivation is vital in the determination of market intervention policies of the government. One hectare is taken as the unit to estimate the 'cost of cultivation' where as one quintal is taken as the unit to work out the 'cost of production'. During estimation of 'unit cost' both implicit and explicit cost are considered. The details of standard cost concepts are given below:

I. Cost A_1: The actual expenses incurred in production by owner operator. The items included are wages of hired human, charges for bullock and

machine labour, market rates of manures, seeds, fertilizer, plant protection chemicals and other necessary inputs, depreciation of implements, machinery and farm buildings, irrigation charges, cess and other taxes, land revenue, for perennials amortized establishment cost, interest on working capital and establishment cost, processing and marketing costs are considered.

II. Cost A_2 = It includes Cost A_1 + rent paid for leased in land.

III. Cost B_1 = It consists of CostA_1 + interest on value of owned fixed capital (other than land). Asset building is one of the key requirements for the prosperous agriculture. In order to encourage the capital formation in our agriculture, this tendency needs to be strengthened. Hence, it is essential to consider the interest on the fixed assets while estimating the cost of cultivation.

IV. Cost B_2 = It includes Cost B_1 + rental value of owned land (net of land revenue) + rent paid for leased land.

The Commission of Agricultural Costs and Prices consider 1/6th of the gross value of produce minus land revenue, taxes and cesses as the imputed value of the rent for the owned land. However, in the present study, the opportunity cost of land is considered for estimating the rental value. The rainfed paddy is the 'next best alternative' crop for the land devoted for arecanut in the traditional region.

V. Cost C_1 = Cost B_1+ imputed value of family labour at the rate of attached farm labour wherever available or else the wage rate of the casual labour. If the family labour does the skilled jobs like tractor driving, harvesting, dehusking and processing of arecanut, the ruling wage rate is considered.

VI. Cost C_2 = Cost B_2+ imputed value of family labour

VII. Cost C_3 = Cost C_2 + 10 per cent of Cost C_2 towards the managerial functions performed by farmers.

Income concepts

The total quantity of arecanut produced along with the proportion under different grades as well as the price received for each grade was considered

Table 1. Estimated regression coefficients for selected districts and Karnataka

Sl. No.	Districts /State	γ	A	P^e_t	A_{t-1}	W_t	R_t	R^2	F	Short run price elasticity	Long run price elasticity
1	Chickmagalur	0.06	464.89 (7321.31)	0.106	0.94*	0.35	-0.31	0.96*	15.36	0.06	1.13
2	Shimoga	0.04	-1235.23 (6726.62)	0.11 (0.416)	0.96* (0.073)	1.30 (0.16)	-0.03 (0.219)	0.98*	30.31	0.05	1.42
3	Uttara Kannada	0.1	-9871.68 (5808.20)	0.83 (0.433)	0.90* (0.073)	1.51 (0.921)	-0.42 (0.261)	0.95*	11.56	0.65	6.50
4	Tumkur	0.06	-10837.8 (4610.18)	1.25** (0.51)	0.94* (0.05)	4.03** (1.38)	-0.026 (0.47)	0.98*	30.31	0.67	11.20
5	Dakshina Kannada	0.36	18548.7 (4139.65)	0.27** (0.12)	0.64* (0.04)	1.60** (0.73)	0.019 (0.084)	0.98*	30.31	-0.11	-0.30
6	Davangere	0.25	-2990.59 (17046.18)	0.84 (1.81)	0.75* (0.18)	0.36 (6.13)	-0.18 (2.10)	0.92*	7.05	0.48	1.92
7	Karnataka	0.07	-36027.8 (30877.78)	2.87 (1.69)	0.93* (0.05)	12.62 (10.54)	-1.10 (0.92)	0.98*	30.31	0.29	4.14

Note: * and ** indicate significance at 1 and 5 per cent respectively; Figures in parenthesis indicate standard error

to arrive at the gross income or total value of main product. The implicit price per quintal was arrived by dividing the total value by the total quantity of arecanut produced by the farmers.

Results and discussion

Acreage in the current year was regressed on the expected price, acreage under crop lagged by one year, average annual rainfall, and the price risk factor. The results of the acreage response analysis and the short and long run price elasticities are presented in the Table 1. The perusal of the Table revealed the significant and high R^2 (0.92 to 0.98) which is an indication of the fact that the variables included in the model could explain 92 to 98 per cent of the variation in the dependent variable in selected districts and for the state as a whole signifying the model as a good fit.

The coefficients of acreage adjustment were low (0.04 to 0.36), signalling institutional and technological rigidities confronting the quick adjustment of current area to the desired level, which reflects more time requirement for area adjustment. Because, the farmers find it difficult to bring more area under cultivation of arecanut suddenly in response to price, since arecanut require a long gestation period of seven years and huge investment to establish areca garden which is beyond the capacity of average farmer with meagre land holding. In contrast, coefficients of acreage adjustment were found to be of higher magnitude in case of annuals (maize, onion *etc*.) reflecting relatively fewer institutional and technological rigidities and constraints in adjusting the area in accordance with price change (Arega, 2000; Rajesh, 2007).

The estimates of the coefficients of expected price revealed positive response of acreage to change in price in all the cases except in Dakshina Kannada district, where the response was negative. Out of six positive estimates, only for Tumkur district it was statistically significant (at 5% level), whereas for Uttara Kannada and state as a whole it was significant at 10 per cent level of probability, which implied that the farmers were price conscious in their decision regarding resource allocation, especially the land resources. (Parmod and Anil, 2006). In contrary, the expected price coefficient was negative in Dakshina Kannada district at 5 per cent level of significance revealing the inverse relation between the price factor and area under arecanut. This might be attributed to the fact that, though arecanut is remunerative, in the recent past it was prone to 'Yellow leaf disease', which has prompted the farmers to uproot their old gardens and replace it with rubber plantation. The positive response of farmers in terms of acreage under cash crops to the price was amply supported by the studies of Lal and Singh (1981) in respect of sugarcane and Basavaraja (1982) for cotton.

As a surrogate for weather, rainfall was used, the coefficient of which was found to be positive in all the cases except in Dakshina Kannada and Davangere district. Out of five positive estimates, it was significant at various levels of probability revealing a positive relation between acreage under crop and average amount of rainfall received. The negative estimate in Dakshina Kannada was significant at 5 per cent level of probability, indicating inverse relation between acreage allocation and rainfall. The coefficient of the price risk factor was negative in all the cases except in Dakshina Kannada district. Negative sign reflects risk averseness of the farmers to the variability in the prices while, the positive sign were indicative of risk bearing nature of the farmers.

Area lagged by one year was found to influence significantly the decision of farmers pertaining to area allocation in all the districts and at the State as well. The coefficients were as high as 0.96 (Shimoga) revealing a slow rate of adjustment in area, while in Dakshina Kannada it was as high as 0.64 reflecting comparatively quicker rate of adjustment.

The results on price elasticities reveals that the magnitude of short run price elasticities were found very low in all the cases reflecting poor acreage responsiveness of growers to price changes during the immediate succeeding crop period, whereas the magnitude of long run price elasticities were found to be of higher magnitude signalling better acreage responsiveness of growers to price change, given the sufficient time for adjustment. Long run price elasticity was high in Tumkur district (11.2) reflecting by and large the arecanut growers would bring 11.2 per cent of additional area under arecanut for every one per cent increase in the expected price, while it was least in case of Chickmagalur district (1.13) indicating that the farmers in Chickmagalur

district could increase the area under arecanut by 1.13 per cent. In contrast, the LRE was negative in Dakshina Kannada indicating that for every one per cent increase in expected price, the area under crop decreases by 0.30 per cent. This might be due to uprooting of old gardens and re-establishing new areca gardens. The other likely reason would be the limited scope for expanding area under arecanut since saturation level for area expansion has been met.

The acreage response was also performed considering competing crops pertinent to the locality such as paddy crop in the case of Shimoga, Davangere, Chickmagalur and Uttar Kannada, coconut in the case of Tumkur and rubber in the case of Dakshina Kannada. The results were insipid because the coefficients for price of competing crop was non significant and there was no improvement in coefficient of multiple determination. The model was also discarded based on model selection criteria such as criteria AIC (Akaike information criteria) and SIC (Schwarz information criteria).

Costs and returns of arecanut production:
Establishment cost

Arecanut being a perennial plantation crop starts bearing at the age of seventh year. The total cost incurred upto seventh year constitute the establishment cost (Table 2). The total expenditure incurred for one hectare of areca plantation was Rs. 9,14,232, out of which, 22.97 per cent (Rs. 2,09,947) was spent during first year itself. Out of total establishment cost, variable cost constitutes 66.07 per cent and remaining 33.93 per cent was shared by fixed cost. Among the variable cost, the human labour shared the biggest portion of expenditure accounting for 22.33 per cent of the total cost. The major labour consuming operation in the initial year was fencing, pit opening, planting and watch and ward and in the subsequent year upto fifth year it was for FYM and red earth application, weeding and irrigation and after sixth year it was for harvesting and processing. Machine labour shared 8.77 per cent of the total establishment cost and was high during the initial year since it was used for land levelling operation and in subsequent years its magnitude was low since its use was restricted to intercultural operation.

Material cost shared 26.74 per cent of total establishment cost. It was observed that areca growers incurred Rs. 1,27,608 (13.96%) and Rs. 37,879 (4.14%) on FYM and Soil respectively. Respondents applied on an average twelve tractor loads of FYM every year, even though the cost involved was high to maintain better soil health. Additional soil was also applied on an average of nineteen tractor loads every alternative year to replenish the nutrient status of land lost due to flood irrigation as opined by the sample respondents. The expenditure on fertilizer for the establishment period was estimated at Rs. 16,960, revealing an average of Rs. 2,384 per annum. This formed 1.86 per cent of the total cost, which was considerably less than the recommended dose because farmers were under the apprehension of only vegetative growth due to the application of fertilizer instead of optimal yield. Fencing material ranked next to the FYM among the material cost accounting for Rs. 28,745. Fencing was essential to protect young seedlings from stray cattle during its critical stage (planting to establishing stage). The planting material was another item of material cost which amounted to Rs. 17,974 and accounting (1.97%) of the total establishment cost, which appeared comparatively high because the respondents purchased seedling from reputed commercial nurseries at an average price of Rs. 12 per seedling. Besides the total cost of planting material, it also includes the cost of replacement.

Out of 66.07 per cent, the labour cost and material cost together constituted 57.57 per cent of the total variable cost of establishment cost. The remaining 8.48 per cent cost was accounted by various costs like interest on working capital, annual repairs and maintenance charges. Irrigation charges were relatively of less importance, as it was provided to the farmers by the government at a nominal charge.

The fixed costs like depreciation, land rent, land revenue and interest on fixed asset formed 33.93 per cent of total establishment cost. Among the fixed cost, the rental value of land was the major cost which accounted for Rs. 1,44,375 which was considerably high because the land values in the recent past has been increasing disproportionately due to increased population pressure, increased purchasing power, economic growth, *etc*. It was followed by interest on fixed asset revealing many areca growers could make a substantial proportion

Table 2. Establishment cost of arecanut

Particulars/year	I		II		III		IV		V		VI		VII		Total		%
	Qty	Value (Rs.)	Qty	Value (Rs.)	Qty	Value (Rs.)	Qty	Value (Rs.)	Qty	Value (Rs.)	Qty	Value (Rs.)	Qty	Value (Rs.)	Qty	Value (Rs.)	Cost
A. Variable cost																	
I. Labour cost																	
i. HumanLabour (mandays)	252.4	37860	181.6	27240	220.9	33135	119	17850	138.6	20790	146	21900	302.8	45420	1361.3	204195	
Hired Labour	200.0	30000	150.0	22500	180.0	27000	71	10650	102.3	15345	107	16050	248.5	37275	1058.8	158820	17.37
Family Labour	52.4	7860	31.6	4740	40.9	6135	48	7200	36.3	5445	39	5850	54.3	8145	302.5	45375	4.96
ii. Machine labour (hours)	90.2	40590	10.4	4680	20.8	9369	10.3	4635	16.6	7470	9	4072	20.7	9324	178.1	80140	8.77
II. Material cost																	
i. FYM (tonnes)	11.7	17655	11.9	17938	12.06	18093	12.29	18443	12.33	18503	12.1	18163	12.5	18813	84.88	127608	13.96
ii .Fertilizers (qtl)	2.04	1475	2.14	1543	2.16	1553	3.26	2348	3.23	2328	3.34	2408	7.36	5305	23.53	16960	1.86
iii. Planting material	1255	15070	152	1824	90	1080	-	-	-	-	-	-	-	1497	17974	1.97	
iv. Fencing material																	
a) Stone pillars	180	8280	-	-	-	-	-	-	-	-	-			-	180	8280	0.91
b) Wiring materials	5.2	20465	-	-	-		-	-	-	-	-	-	-	-	5.2	20465	2.24
v. Lime (kg)																	
vi. Red earth/ silt (ton)	19	9530	-	-	18.9	9493	-	-	18.8	9418	-	-	18.87	9438	75.57	37879	4.14
vii. Irrigation charges	-	188		188	-	188		188		188		188		188		1316	0.14
viii. Weedicide (litre)			-	-	-	-	2.8	793	2.92	820	3.04	853	3.29	923	12.05	3389	0.37
ix. Kalipak	-	-	-	-	-	-	-	-	-	-	-	388	-	1140	-	1528	0.17
x. Plant protection chemicals (litres)	6	1800	4	1200	4	1200	4	1200	-	-	-	-	9.3	2813	27.3	8213	0.90
xi. Repairs	-	8093	-	8093	-	8093	-	8093	-	8093	-	8093	-	8093	-	56651	6.20
xii. Interest on working capital	-	4629	-	2195	-	2885	-	1830	-	2373	-	1978	-	3558	-	19448	2.13
Total variable cost		165635		64901		85089		55380		69983		58043.5		105015		604046.5	66.07
B. Fixed cost																	
i. Land revenue		27.3		27.3		27.3		27.3		27.3		27.3		27.3		191.1	0.02
ii. Depreciation		10497.5		10497.5		10497.5		10497.5		10497.5		10497.5		10497.5		73482.5	8.04
iii. Interest on fixed capital (8%)		13162.5		13162.5		13162.5		13162.5		13162.5		13162.5		13162.5		92137.5	10.08
iv. Land rent		20625		20625		20625		20625		20625		20625		20625		144375	15.79
Total fixed cost		44312.3		44312.3		44312.3		44312.3		44312.3		44312.3		44312.3		310186.1	33.93
Total establishment cost (A+B)		209947.3		109213.3		129401.3		99692.3		114295.3		102355.8		149327.3		914232.6	100.00
C. Net returns from crop																	
i. Inter crop				35200		76800		61450								173450	
ii. Main crop											1.62	26000	8.75	140000		166000	
Total net returns																339450	
Net establishment cost (A+B-C)		209947.3		74013.3		52601.3		38242.3		114295.3		76355.8		9327.3		574782.6	

of investment on capital goods like various machineries.

Table 2 also reveals that the total net returns include returns from intercrop and main crop. The intercrop starts giving its returns from the second year itself and continues to return upto fourth year, while main crop starts yielding returns from sixth year although the yield is considerably less. The net returns realized by growers from intercrop was Rs. 1,73,450 and the gross returns from the sale of main crop during 6th and 7th year of establishment were of the order Rs. 26,000 and Rs. 1,40,000 respectively. Total returns from main crop and intercrop during establishment period amounted to Rs. 3,39,450 revealing net establishment cost of Rs. 5,74,782. This clearly reveals that the establishment cost could be substantially reduced by undertaking intercrops during establishment stage.

Maintenance cost

Table 3 comprise standard cost concepts reflecting the cost of cultivation of arecanut in the study area. The total cost of cultivation of arecanut was Rs. 2,78,702 (Cost C3). Cost A1 is equal to Cost A2 in case of arecanut since the practice of leasing of land is prohibited. The magnitude of Cost A1 was

Table 3. Maintenance cost

SI.No.	Particulars	Physical units	Value (Rs)	% to the total cost
I	Material costs/prime costs/input costs			
	Human Labour (hired)	370.0	55500	19.91
	FYM (tonnes)	12.6	19002	6.82
	Fertilizer (quintals)	8.0	5785	2.08
	Plant protection chemicals (litres)	15.2	4550	1.63
	Red earth/silt (tonnes)	18.9	9470	3.40
	Irrigation charges (Rs.)		188	0.07
	Weedicide (litres)	3.2	902	0.32
	Kalipak		1132	0.41
	Repairs		8092	2.90
	Interest on working capital		4297	1.54
	Land revenue		27	0.01
	Depreciation		10498	3.77
	Interest on establishment cost		72598	26.05
	Amortized establishment cost		18743	6.72
	Marketing cost		1670	0.60
II	Cost A1= Cost A2		212453	
	Interest on fixed asset		13163	4.72
III	Cost B1		225615	
	Rental value of owned land		20625	7.40
IV	Cost B2		246240	
	Family labour	60.0	9000	3.23
V	Cost C1= Cost B1+Family labour		234615	
VI	Cost C2= Cost B2+Family labour		255240	
	Managerial cost		23462	8.42
VII	Cost C3= Cost C2+ Managerial cost		278702	100.00
	Economics of crop yield			
	Output (quintals)	21.5		
	Gross return		344000	
	Net return		65298	
	Cost per quintal of output		12544	

Rs. 2,12,453. The major part of Cost A1 was interest on establishment cost (26.05%) reveals that the farmers have made a bulk investment in establishing arecanut garden. Among the material cost, wages paid to the hired labour (19.91%) forms the major portion of the total cost. Other material costs like cost on FYM (6.82%), red earth (3.40%) and fertilizer cost (2.08%) have also contributed substantially to Cost A1. The wages for hired human labour shared 19.91 per cent of the total cost which might be due to the activities like harvesting and processing which consume maximum labour in addition to other regular cultural practices. The expenditure on manure was the next important material cost, along with FYM; soil was also applied to supplement nutrient contents. Expenditure on fertilizer was only Rs. 5,785 revealing that farmers are not applying fertilizer in desired doses as they are averse to its use. With regard to the plant protection chemical, only few farmers had taken up timely measures to spray crop with suitable chemical because of lack of awareness about the identification of pests and diseases and their control. The other variable costs induced in production of arecanut were kalipak (preparation made up of tree barks, jaggery and lime used for processing red boiled type of Arecanut), annual repairs and interest on working capital which were of relatively less importance. Amongst cost A1 the share of marketing cost was meagre accounting 0.60 per cent which was too low because of the location of APMC in the vicinity of the sample taluks.

The cost B1 was Rs. 2,25,615 which comprises of cost A1 and interest on fixed capital. The proportion of interest on fixed capital to the total cost was 4.32 per cent revealing the fact that farmers have made substantial investment on capital assets like machineries and implements. The cost B2 was about Rs. 2,46,240 which encompasses the rental value of land.

Cost C1 and Cost C2 were Rs. 2,34,615 and Rs. 2,55,240 respectively, which are composed of Cost B1, Cost B2 and imputed value for family labour. The total cost of cultivation reflected in Cost C3 comprises of Cost C2 and managerial cost which accounted to Rs. 2,78,702.

Returns from arecanut cultivation as revealed from the Table 3 highlights that the total arecanut output obtained per hectare was 21.5 quintals valuing Rs. 3.44 lakhs which was very high when compared to the competing paddy crop in Shimoga district while the cost of cultivation of arecanut was also high, valuing Rs. 2,78,702 and net returns over cost of cultivation was comparatively high with paddy revealing the difference of around Rs. 50,410 (Sivanagaraju, 2006). This might be attributed to the prevalence of remunerative prices for arecanut during the study period.

Conclusion

Arecanut enterprise was proved remunerative compared to any of the competing crops like paddy, maize *etc*. in major areca growing districts. This can be considered as a vital factor responsible for transition in cropping pattern from paddy to arecanut. The impact of transition was apparent in increased production of arecanut, which was due to extensive cultivation rather than intensive one. The long run price elasticities were found more indicating that the acreage adjustment would normally take place in long run.

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