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RESEARCH PAPER

Impact of technological change in cashew production in south Konkan region of Maharashtra

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Abstract : Cashewnut (*Anacardium occidentale* L.) a cash crop also called as Dollar earning crop. Maharashtra is leading state in production and productivity of cashew due to maximum adaptation of high yielding varieties and modern technologies developed by the Dr. BSKKV, Dapoli, Ratnagiri. The study entitled, "Technological change in cashew production in south Konkan region (Maharashtra) – an economic analysis" was undertaken specific objectives, to estimate the technical efficiency in cashew production across level of adoption and to assess the impact of technology on productivity. 320 cashew growers were selected for the study. Technical efficiency for all farms were calculated by using frontier production function and then the farms were grouped into three categories. As the results show that, in Vengurla - 4 variety orchard more farms had medium technical efficiency *i.e*., between 50 to 75 per cent as compared to low (< 50%) and high (> 75%) technical efficiency group. Average per cent of technical efficiency at overall level was 67.19 per cent. Among the groups such as low, medium and high adopters it was 59.34 per cent, 56.37 per cent and 90.25 per cent, respectively. At overall level about 62 farms had high technical efficiency more than 75 per cent, 233 farms had medium technical efficiency (50 to 75%) and about 25 farms had low technical efficiency (less than 50%). The use of chemical fertilizers and plant protection chemicals were sparse. This concluded that the farmers were not properly aware about the use of chemical fertilizers and followed the pest management schedule. It is also showed that, there is potential to increase the yield, through technology adoption. For increasing farm income of the farmer, they must be using the modern cashew production technologies.

Key Words : Cashewnut production, Technology adoption, Per unit cost, Technical efficiency

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INTRODUCTION

Cashewnut (*Anacardium occidentale* L) a cash crop also called as Dollar earning crop. It was originated from Brazil, but during the 16th century Portuguese sailors introduced it in India for the purpose of afforestation and as a soil binder for the conservation of soil. Cashew belongs to the *Anacardecea* family which is drupe fruit type. The drupaceous kidney shaped fruit is surrounded by grey colour hard coat and attached outwardly to peduncle of the cashew *i.e*., cashew apple. Maharashtra

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is leading state in production and productivity of cashew due to maximum adaptation of high yielding varieties and modern technologies developed by the Dr. BSKKV, Dapoli, Ratnagiri. Although, Maharashtra accounts only for 18 per cent of the total area but, productivity is relatively higher compared to other states. The Konkan region is one of the major cashews growing belts in the country which is situated on west coastal region of India, covering area about 1.83 lakhs per hectare with production of 2.37 lakh tonnes as well as average productivity of 1150 kg per hectare. Topographically and with climatic point of view this region is different from other parts of the country. Agricultural Universities in the state are engaged in releasing new high yielding and hybrid varieties of different crops suitable for different agro-climatic zones. Similarly, on the basis of continuous research, new technologies are developed and released for farmers due to which the production and productivity of different crops have been increased. On the basis of research, scientists are giving different recommendations for increasing productivity and ultimately for minimizing the per hectare cost of cultivation. But fact is that, farmers are not adopting all these technologies completely as per recommendation. Therefore, there is a big gap between the potential yield and actual yield on farmer's field. It is essential to understand that, at what scale, these technologies are used by the farmers.On this backdrop, the present investigation is undertaken with following specific objectives. To estimate the technical efficiency in cashew production across level of adoption and to assess the impact of technology on productivity.

MATERIAL AND METHODS

In Konkan region, Sindhudurg and Ratnagiri districts (South Konkan Region) are leading in area, production and productivity of cashew than the other districts of this region and hence South Konkan region was selected purposively for the study.Four tahsil each, from the two districts and four villages from each selected tahsils was selected randomly. From each selected village, 10 cashew growers were selected randomly. A separate sample of

Table A : Recommended technologies by Dr. BSKKV, Dapoli selected for the study

Sr. No.	Recommended technologies
1.	Spacing adoption (7m x 7m) and planting month
2.	High yielding variety adoption
3.	Size of planting material e.g., 4 to 6 months old with small bags (6" x 8") or 1 to 1.5-year-old in (9"x 11" or 11" x 13") large bags
	Recommended dose of fertilizers
	a. Recommended dose of nitrogen
4.	b. Recommended dose of phosphorous
	c. Recommended dose of potassium
	d. Recommended dose of FYM
5.	Foliar spray of nutrients
6.	Foliar spray of plant growth regulators
7.	Canopy management through training and pruning
8.	Drip irrigation technique
9.	Pest management in cashew
10.	Diseases management in cashew
11.	Foliar spray for pollinator attraction in cashew
12.	Rejuvenation of saline cashew plantation by top working
13.	Rejuvenation of saline cashew plantation by coppice grafting
14.	Nut yield quantification based on harvesting technology
15.	Apple harvesting technique and its further utilization
	Cashew nuts coming in the market
16.	a. Varietal preferences by cashew processor / Agent
	b. Price difference
17.	Intercropping in cashew

two cashew growers were selected at the age of 1st to 5th year for each village. Thus, final sample consist of 380 cashew growers. The primary data required for the study were collected during year 2018-19 from selected growers by adopting personal interview method with the help of specially designed schedule. Selected cashew growers were classified as per Technology Adoption Index (TAI).

There are several technologies recommended by Dr. BSKKV, Dapoli for farmers in Konkan region for cashew production. However, out of these, important technologies were selected and they were grouped into relevant technology components. The technologies recommended for cashew production in Konkan region are shown in Table A.

Analytical tools:

In the present study, different statistical techniques such as percentages, ratios, different cost concepts and higher analytical techniques, such as Cobb Douglas production function analysis and Timmer measure of technical efficiency were used.

Technology adoption index:

On the basis of this information the 'Technology Adoption Index" of each farmer was estimated by using following formula. (Anupama *et al.* 2005).

$$\mathbf{TAI} = \frac{1}{k}\left(\frac{AX_1}{RX_1} + \frac{AX_2}{RX_2} + \cdots + \frac{AK_k}{RX_k}\right) x100$$

where,

TAI = Technology adoption index

K = No. of technologies

AX_k = Actual use of selected technology

RX_k = Recommended use of selected technology

The components of technology recommended by the university for cashew crop expressed in terms of adoption score ($X_1, X_2 \ldots X_n$) were utilized for developing technological adoption index of technology adopted. A technological adoption index is a single numerical value representing the net adoption of all components of technologies whose value lies between 0 to 1.

The net adoption of recommended technologies expressed in terms of "Technological adoption index" for high yielding variety cashew garden were classified as below.

Group I (Low adopter) = Mean – SD

Group II (Medium adopter) = Mean – SD to Mean + SD

Group III (High adopter) = Greater than Mean + SD

where,

Mean = Arithmetic mean of technology adoption index of all the cashew growers and all the technologies.

SD = Standard deviation of technology adoption index.

Production function analysis :

The production function analysis approach was used to identify the factors influencing the yield of cashew. The transformation of inputs into output is described the production function.

$$\mathbf{Y = f\ (X_1 X_2).....X_n}$$

where,

Y is the output of crop with a given set of inputs X_1 $X_2 \ldots\ldots X_n$

The Cobb-Douglas type production function specified below was used for the present analysis.

$$\mathbf{Y = f\ (a\ x_1^{b1}\ a\ x_2^{b2} .....X_n^{bn} U)}$$

where,

Y = Production of cashew crop (q/garden)

A = Intercept, a scale parameter

X_1 = Area under cashew (ha/garden)

X_2 = Human labour (days/garden)

X_3 = Quantity of nitrogen (kg/garden)

X_4 = Quantity of Phosphorus (kg/garden)

X_5 = Quantity of Potassium (kg/garden)

X_6 = Quantity of FYM (t/garden)

X_n = Identified technologies

b1 to b10 = Regression co-efficient of respective variables

U = Error term.

The technical efficiency in production was estimated using the stochastic frontier production function. (Elsamma and George, 2002). The stochastic frontier production function of the Cobb- Douglas type was specified for this study and was defined as follow:

$$\mathbf{Ln\ Y = \sum bilog\ Xi + Ui}$$

where, $Ui \leq 0$

In estimating the frontier production function Corrected Ordinary Least Squares (COLS) was chosen as the most of convenient means. As a first step, OLS is applied to the C-D type production function to obtain best unbiased estimates of bi co-efficients. The constant (intercept) estimate is then corrected by adding the largest error term of the fitted model to the intercept.

Timmer measure of technical efficiency :

Timmer measure of technical efficiency of a farm is the ratio of the actual output to the potential output given the level of input use on farm 'i'. It thus, indicates how much extra output could be obtained if farm 'ith' were to be on the frontier.

Timmer measure of technical efficiency,

$$TE = \frac{Y}{Y^*}$$

where,

Y* = The maximum attainable output at given levels of input (frontier output).

Y= Actual output.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Distribution of sample cashew growers:

The distribution of sample of cashew growers was done according to technology adoption index (TAI). The technology adoption index for all the selected cashew growers was measured and they were classified into following three categories and presented in Table 1. The classification of cashew growers was grouped into three categories *i.e.,* low adopters (14.69%), medium adopters (67.81%) and high adopters (17.50%). It was found that at the overall level of technology adoption, index score in the study area was 39.84 per cent which indicated large scope to increase the level of adoption. The maximum level of adoption in medium adoption group was 67.81 per cent followed by high adoption group (17.50%) and low adopter group (14.69%). The results are in conformity with that of Torane *et al.* (2015), Patil and Nemade (2016).

Per hectare cost of cultivation of sample cashew orchard :

The per hectare item wise cost of cultivation of cashew orchards was worked out and is given in Table 2.

It is seen from the table that, at the overall level per hectare total cost of cultivation (Cost-C) of cashew orchards worked out to be Rs.149335.29. Cost-A and Cost-B were calculated to Rs. 40853.14 and Rs. 85943.71, respectively. As regards the item-wise cost of cultivation at the overall level, the share of labour cost (Rs. 80022.12) was maximum followed by rental value of land (Rs. 44299.99), plant protection measures (Rs. 447.90), manures and fertilizers (Rs. 4695.15). It is further revealed from the table that, the per hectare total cost of cultivation (Cost-C) in case of orchards in low adopters group was Rs. 141442.55, in medium adopters' group was Rs. 145451.30 and it was Rs. 156852.85 in case of orchards in high adopters' group. This indicated that, the trend in cost of cultivation was continuously increasing with adoption level. This may be because of the growers in high adopters' group were using comparatively higher quantities of almost all the inputs than the growers in low adopters' group. The benefit ratio at overall level was 1.78 which showed that, cashew was profitable crop.The results proved that, the trend in cost of cultivation was continuously increasing with adoption level. This might be due to growers in high adopters' group were using comparatively higher quantities of almost all the inputs than the growers in low adopters' group. The benefit cost ratio was more than one in all groups, indicating that cashew production was profitable in the study area and it has shown increasing trend with increase in adoption of technology. The increasing trend of gross returns and input output ratio underlines the importance of technology adoption.

Table 1 : Classification of sample cashew growers on the basis of technology adoption index (TAI)

Sr. No.	Range of technology adoption index (%)	No. of sample farmers	Category of technology adoption
1.	Upto 26.96	47 (14.69)	Low
2.	26.97 to 52.72	217 (67.81)	Medium
3.	Above 52.73	56 (17.50)	High
	Total	320 (100.00)	
	Arithmetic mean (TAI)	39.84	
	Standard deviation (TAI)	12.88	

Functional analysis :

The production function expressing per hectare yield in quintals as a function of different inputs used in the cashew production was estimated to know the resource use efficiency in cashew production a Cobb-Douglas type of production function was employed at the all levels *i.e.,* low, medium, high and overall level, a stepwise regression analysis was carried out. The results of stepwise regression analysis are given in Table 3a,b,c and d.

The analysed data in Table 3a proved that, out of eight variables considered, two variables namely, Manures (X_1) and plant protection (X_2) significantly ($P<0.05$) influenced the yield of cashew in high adoption group. Both of these variables explained 57.37 per cent variation in yield of cashew. The contribution of manures and plant protection variables are 50.39 and 6.98 per cent observed, respectively. In high adopter group the manures application and plant protection technology influence the adoption of cashew production technology.

It was found that from the Table 3b out of eight variables considered, five variables *i.e.,* manures (X_1), potassium (X_2), plant protection (X_3), no. of tress (X_4) and canopy management (X_5) had significant influence on yield of cashew. These variables explained 81.34 per cent variation in yield of cashew. The contribution of manures, potassium, plant protection, no. of tress and canopy management are 66.67, 7.98, 3.21, 2.17 and 1.31 per cent observed, respectively. In medium adopter group the contribution of manures, potassium, plant protection,

Table 2 : Per hectare cost of cultivation of sample cashew orchard **(Figures in Rs.)**

Sr. No.	Item of cost	Low adopters (n=47)	Medium adopters (n=217)	High adopters (n=56)	Overall (n =320)	Per cent
1.	**Hired labour**					
	(a) Male	10529.63	10376.22	10496.30	10429.90	6.98
	(b) Female	23004.97	22082.69	22736.58	22380.66	14.99
2.	**Manures**	1479.37	2273.91	2636.85	2354.01	1.58
3.	**Fertilizers**					
	(a) Nitrogen	553.45	893.55	1400.27	1055.59	0.71
	(b) Phosphorus	590.09	923.49	1350.89	1057.13	0.71
	(c) Potassium	129.87	202.18	287.33	228.42	0.15
4.	**Plant protection chemicals**					
	(a) In kg	584.78	498.83	343.32	447.90	0.30
	Total input cost	36872.15	37250.88	39251.53	37953.61	25.42
5.	Land revenue	69.33	54.38	46.78	52.59	0.04
6.	Depreciation and repairing charges	920.83	658.16	367.79	569.72	0.38
7.	Interest on working capital (@ 6%)	2212.33	2235.05	2355.09	2277.22	1.52
	Cost – A	40074.63	40198.47	42021.19	40853.14	27.36
8.	Interest on fixed capital (@ 10%)	1247.68	911.13	519.17	790.58	0.53
9.	Rental value of land (1/6th of the gross return - land revenue)	37689.69	42870.28	47732.42	44299.99	29.66
	Cost – B	79012.01	83979.87	90272.78	85943.71	57.55
	Family labour					
10.	(a) Male	33843.39	32046.21	34895.89	33199.70	22.23
	(b) Female	12515.28	13315.47	15374.36	14011.86	9.38
11.	Supervision charges (@ 10% on cost A)	3687.22	3725.09	3925.15	3795.36	2.54
12.	Amortization value.	12384.66	12384.66	12384.66	12384.66	8.30
	Cost – C	141442.55	145451.30	156852.85	149335.29	100.00
13.	Gross returns	226554.11	257547.94	286675.22	266115.50	
14.	Per quintal cost	10251.29	9266.13	9027.13	9227.66	
15.	Input-output ratio	1.60	1.77	1.83	1.78	

no. of tress and canopy management influence the adoption of cashew production technology.

The data showed in Table 3c concluded that, out of eight variables considered, three variables *i.e.,* manures (X_1), potassium (X_2) and canopy management (X_3) had significantly ($P<0.05$) affected on yield of cashew. These variables explained 83.94 per cent variation in yield of cashew. The contribution of manures, potassium and canopy management are 43.78, 27.34 and 12.82 per cent observed, respectively. In low adopter group the contribution of manures, potassium and canopy management influence the adoption of cashew production technology.

From the Table 3d it was showed that, out of eight variables considered, five variables *i.e*., manures (X_1), no. of tress (X_2), plant protection (X_3), canopy management (X_4) and potassium (X_5) was significantly ($P<0.05$) influenced on yield of cashew. These variables explained 89.25 per cent variation in yield of cashew. The contribution of manures, potassium, plant protection, no. of tress and canopy management are 77.79, 0.46, 8.67, 1.33 and 1.00 per cent observed, respectively. In overall adopter group the contribution of manures, potassium, plant protection, no. of tress and canopy management influence the adoption of cashew production technology.

Timmer measure of technical efficiency :

With a view to compute an output-based measures of efficiency Cobb-Douglas type specification imposed by Timmer was used. The approach was to specify a fix parameter for statistical analysis. The ratio of the actual output to the potential output conditioned on the level of inputs used on the farm is termed as Timmer measure of technical efficiency of an individual farm. Farm specific technical efficiency with respect to different adopter groups is presented in Table 4. On the basis of technical efficiency, the farms were classified as high, medium and low with respect to mean and standard deviation explained in methodology.

Table 3a : Production function estimates in cashew cultivation for high adopter group

Sr. No.	Resource	Regression co-efficients	Contribution (%)
1.	Intercept	5.76636 (1.654390)	
2.	X_1 – Manures (t.)	0.29055* (0.03879)	50.39
3.	X_2 – Plant protection (Kg.)	0.02584* (0.00877)	6.98
4.	R^2	0.5737	
5.	Adjusted R^2	0.5436	
6.	No. of observations	56	
7.	Returns to scale (Σbi)	0.31639	
8.	F value	33.7652	

* indicate significance of value at P=0.05 (Figures in parentheses indicates standard error)

Table 3b : Production function estimates in cashew cultivation for medium adopter group

Sr. No.	Resource	Regression co-efficients	Contribution (%)
1.	Intercept	-11.44913 (2.12908)	
2.	X_1 – Manures (t.)	0.388844 (0.02780)	66.67
3.	X_2 –Potassium (kg)	0.16199 (0.03224)	7.98
4.	X_3 – Plant protection (kg.)	0.04174 (0.03872)	3.21
5.	X_4 – No. of trees (ha)	0.03945 (0.00841)	2.17
6.	X_5 – Canopy management	0.00783 (0.00204)	1.31
7.	R^2	0.8134	
8.	Adjusted R^2	0.73915	
9.	No. of observations	217	
10.	Returns to scale (Σbi)	0.63945	
11.	F value	123.414	

* indicate significance of value at P=0.05 (Figures in parentheses indicates standard error)

Table 3c : Production function estimates in cashew cultivation for low adopter group

Sr. No.	Resource	Regression co-efficients	Contribution (%)
1.	Intercept	0.87379 (0.65755)	
2.	X_1 –Manures (t.)	0.14814 (0.04370)	43.78
3.	X_2 – Potassium (kg.)	0.48905 (0.08348)	27.34
4.	X_3 – Canopy management	0.04304 (0.00432)	12.82
5.	R^2	0.8394	
6.	Adjusted R^2	0.8014	
7.	No. of observations	47	
8.	Returns to scale Σbi)	0.68023	
9.	F value	6.96297	

*Significant at 5% level (Figures in parentheses indicates standard error)

Table 3d : Production function estimates in cashew cultivation for overall adopter group

Sr. No.	Resource	Regression co-efficients	Contribution (%)
1.	Intercept	-4.73064 (1.82575)	
2.	X_1 – Manures (t.)	0.25240 (0.01633)	77.79
3.	X_2 – No. of trees (ha)	0.02935 (0.00804)	0.46
4.	X_3 – Plant protection (kg.)	0.05659 (0.00889)	8.67
5.	X_4 – Canopy management	0.01212 (0.00175)	1.33
6.	X_5 – Potassium (kg.)	0.15082 (0.02623)	1.00
7.	R^2	0.8925	
8.	Adjusted R^2	0.85849	
9.	No. of observations	320	
10.	Returns to scale (Σbi)	0.50128	
11.	F value	323.534	

*Significant at 5% level (Figures in parentheses indicates standard error)

From Table 4 it was revealed that, farm specific technical efficiencies ranged between 31.38 per cent and 100.00 per cent. Average per cent of technical efficiency at overall level was 67.19 per cent. Among the groups such as low, medium and high adopters it was 90.25 per cent, 56.37 per cent and 59.34 per cent, respectively. At overall level about 62 farms had high technical efficiency *i.e.,* more than 75.00 per cent, 233 farms had medium technical efficiency (50% to 75 %) and about 25 farms had low technical efficiency (<50%). It is concluded that, technical efficiency in cashew production is increasing with adoption of technology. Hence hypothesis regarding technical efficiency in cashew production is low has rejected.

The technical efficiency according to farm size of sample cashew growers is given in Table 5. Farmers having small land holding (< 2.0 ha) area had technical efficiency 56.34 per cent. Large farmers, who hold area more than 4.0 ha, had technical efficiency 76.64 per cent and the medium farmers it was 60.51 per cent. The farm size and technical efficiency has exhibited positive relationship in cashew production. However, there was comparatively less difference in technical efficiency of farms of different size of holding. However, it was concluded that, from the results of the study the difference between technical efficiency level in different size holding. It is proved that there is further scope for increasing the cashew production with present level of resource used.

Profitability of cashew production :

The per hectare profitability of cashew orchards in various technology adoption group was worked out and presented in Table 6. At the overall level per hectare yield of cashew orchards was 16.18 q which valued at Rs. 266115.50. At overall level, the profit at Cost-A, Cost-B and Cost-C was Rs. 40853.14, Rs. 85943.71 and Rs. 149335.29 respectively. Regarding the profitability among

Table 4 : Technical efficiency of sample Vengurle 4 cashew orchards as per technology adoption level

Sr. No.	Particulars	High adopters (n=56)	Medium adopters (n=217)	Low adopters (n=47)	Overall (n=320)
1.	Average technical efficiency (%)	90.25	56.37	59.34	67.19
2.	Efficiency level (No. of farms)				
	High efficiency (TE > 75%)	56 (100.00)	1 (0.46)	5 (10.64)	62 (19.38)
	Medium efficiency (TE 50% to 75%)	0 (0.00)	200 (92.17)	33 (70.21)	233 (72.81)
	Low efficiency (TE <50%)	0 (0.00)	16 (7.37)	9 (19.15)	25 (7.81)
	Total farms	56 (100.00)	217 (100.00)	47 (100.00)	320 (100.00)
3.	Minimum efficiency (%)		31.38		
	Maximum efficiency (%)		100		

(Figures in parentheses are percentages to total farms)

Table 5 : Technical efficiency according to farm size of sample cashew growers

Sr. No.	Particulars	Efficiency level (%)
1.	Small farmers (? 2.0 ha)	56.34
2.	Medium farmers (2.0 – 4.0 ha)	60.51
3.	Large farmers (? 4.0 ha)	76.64
	Overall	62.74

Table 6 : Per hectare profitability of cashew cultivation at various technology adoption levels

Sr. No.	Particulars	Low adopters (n=47)	Medium adopters (n=217)	High adopters (n=56)	Overall (n=320)
1.	Yield (q)	13.80	15.70	17.38	16.18
2.	Increase in output (%)	0	113.77	125.93	117.29
3.	Gross returns (Rs.)	226554.11	257547.94	286675.22	266115.50
4.	Cost (Rs.)				
	1. Cost A	40074.63	40198.47	42021.19	40853.14
	2. Cost B	79012.01	83979.87	90272.78	85943.71
	3. Cost C	141442.55	145451.30	156852.85	149335.29
5.	Profit at (Rs.)				
	1. Cost A	186479.48	217349.47	244654.03	225262.36
	2. Cost B	147542.10	173568.07	196402.43	180171.79
	3. Cost C	85111.56	112096.64	129822.37	116780.21
6.	Per quintal cost of cultivation (Rs.)				
	1. Cost A	2904.48	2560.89	2418.39	2524.38
	2. Cost B	5726.53	5350.03	5195.34	5310.59
	3. Cost C	10251.29	9266.13	9027.13	9227.66
7.	Benefit cost ratio	1.60	1.77	1.83	1.78
8.	Saving of cost (Rs.)				
	Per hectare				
	1. Cost A	0	123.84	1946.56	-
	2. Cost B	0	4967.87	11260.78	-
	3. Cost C	0	4008.75	15410.30	-
	Per quintal				
	1. Cost A	0	343.59	486.09	-
	2. Cost B	0	376.50	531.19	-
	3. Cost C	0	985.16	1224.15	-

the groups, the orchards in high adopters' group were more profitable than the orchards in medium adopters' group and the orchards medium adopters' group than the orchards in low adopters' group at different cost levels.

Conclusion:

– The average technology adoption index of cashew production was 39.84 per cent in V-4 group.

– Use of inputs was found increased with technology adoption. It was highest in high adopters' group as compared with low adopters' group.

– The per hectare yield of the cashew orchard was found increased with level of technology adoption. In low, medium and high adopters' group per hectare yield was 13.80 q, 15.70 q, 17.38 q with 16.18 q at overall level.

– The per hectare input-output ratio in low, medium and high adopters' group of V-4 variety group it was 1:1.60, 1:1.77, 1: 1.83. At overall level it was 1:1.78.

– Due to adoption of technologies per hectare yield and gross returns were observed to be increased by 3.58 q and Rs.60121.11, respectively in V-4 variety group.

– Adoption of cashew production technology increases the cashew yield. Therefore, application of manure, number of trees per hectare, plant protection measures, canopy management and potassium influence the adoption of cashew production technology in V-4 variety.

– The average percentage of technical efficiency in V-4 variety group, at overall level was 67.19. Among the groups such as high, medium and low adopters it was 90.25 per cent, 56.37 per cent and 59.34 per cent.

– In V-4 variety group at overall level about 62 farms had high technical efficiency *i.e.*, more than 75 per cent, 233 farms had medium technical efficiency (50 to 75%) and about 25 farms had low technical efficiency (less than 50%).

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