Comparative Cost Benefit Analysis of Alphonso Mango Orchards and Cashew Orchards in the South Konkan Region of Maharashtra

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ABSTRACT

The research is undertaken to find out the cost of establishment of the alphonso mango and cashew orchards, to find out the cost of operation and maintenance of the alphonso mango and cashew orchards and to find out the benefit cost ratio of the alphonso mango and cashew orchards in the South Konkan region. Alphonso mango and cashew farmers are selected as sample by using convenience sampling method.

The average establishment cost of the alphonso mango orchard is comparatively more than the average establishment cost of the cashew orchard. The average operation and maintenance cost of the mango orchard is comparatively more than the average operation and maintenance cost of the cashew orchard. The benefit cost ratio is comparatively higher among the alphonso mango farmers and comparatively lower among the cashew farmers.

Keywords:-cost of establishment, cost of operation and maintenance, cost benefit ratio

INTRODUCTION

The South Konkan region forms the major part of Maharashtra's western coastal belt, extending from Ratnagiri to Sindhudurg district. It is bounded by the Arabian Sea on the west and the Sahyadri ranges on the east, creating a narrow but diverse strip of land rich in natural and cultural heritage. The region's geography is characterized by undulating terrain, lateritic plateaus, river valleys, and lush green forests, which together shape its distinct ecological identity.

Almost 90% productive mango cultivation in the Konkan region is of alphonso variety. New mango orchards are established from the Employment Guarantee Scheme linked Fal Lagvad Yojana. Majority of mangoes are derived from the old alphonso orchards from the Ratnagiri and Sindhudurg districts. Because of the low productivity and irregular bearing of alphonso mango, the mango productivity of the Konkan region is lowest in the state.

The major mango varieties cultivated in the konkan region of the Maharashtra are Alphonso, Pairy, Raiwal, Kesar, Ratna, Sindhu, Kokan Ruchi, Goa Mankur (Mankurad) and Totapuri.Alphonso well-known for its optimum shape, size, attractive colour, flavour and good keeping quality.

The Konkan region, which spans the coastal districts of Maharashtra in particular Ratnagiri and Sindhudurg as well as Goa, is India's leading zone for high-quality cashew cultivation. The cashew tree (Anacardium occidentale L.) was introduced by the Portuguese in the 16th century, initially for soil conservation on the hilly, lateritic slopes of the region.

The **cashew orchard in the Konkan region** holds a prominent place in Maharashtra's horticultural landscape. Stretching along the western coast, the Konkan's red lateritic soils, high humidity, and well-distributed rainfall provide ideal conditions for cashew cultivation. Districts such as Ratnagiri, Sindhudurg, and Raigad are

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renowned for extensive cashew plantations that significantly contribute to local livelihoods and regional income.

Cashew cultivation in Konkan not only provides income through nut processing and cashew apple-based products like feni and juice but also generates substantial rural employment, especially for women. Government initiatives and farmer cooperatives have promoted better management practices, pest control, and marketing support. Overall, Konkan's cashew orchards represent a successful blend of traditional cultivation and modern horticultural advancement, contributing significantly to the coastal economy.

The cost of establishment of the orchard include cost of grafts, labour, manures, fertilizers, plant protection, fencing and other charges.

Cost of operation and maintenance of the orchard consist of Input Cost, Cost A, Cost B and Cost C i.e. total cost. Input Cost consist of cost of hired labour, manures, fertilizers, plant protection chemicals and growth regulators. Cost A include Input Cost plus land revenue and other taxes, depreciation on fixed assets and repairing charges and interest on working capital. Cost B consist of Cost A plus interest on fixed capital, land rent and amortization value. Cost C include Cost B plus family labour and supervision charges.

REVIEW OF LITERATURE

Shukla (1996) has categorized Costs into Cost A1, Cost A2, Cost B and Cost C in the farm management studies in India.

Cost A1 consist of the cost of seeds, fertilizers and manures, livestock expenses, plant protection, irrigation charges, hired human labour, land revenue, depreciation on fixed assets, interest on working capital and other expenses.

Cost A2 = Cost A1 + Rental value of owned land + Interest on fixed capital - Land revenue on owned land.

Cost C = Cost B + Imputed value of family labour.

Sawant and Jadhav (2022) examined establishment costs in Ratnagiri and Sindhudurg districts. The study found that per-hectare establishment cost averaged ₹92,500, with labour and planting material comprising 70% of total expenditure. Use of Vengurla-7 variety and adoption of organic manure reduced maintenance costs. Farmers who adopted government-supported cashew replantation schemes reported 35% subsidy assistance, making the orchard establishment more viable. The study recommended forming farmer producer organizations (FPOs) for cost sharing in land preparation and irrigation infrastructure.

Nayak and Paled (2018) reported a BCR of 1.83 for grafted cashew orchards, indicating profitability even under rising labour costs. The net present value (NPV) and internal rate of return (IRR) were also positive, reflecting long-term economic sustainability. Major cost factors influencing BCR included fertilizer expenditure, labour, and pest management. Sensitivity analysis revealed that profitability declines under reduced yield or increased wage conditions. However, favourable soil-climate conditions, high market prices for raw cashew nuts, and proper maintenance practices sustain a high BCR. Thus, cashew remains one of the most profitable plantation crops in the coastal Konkan belt when scientific management and improved grafts are used. Nayak and Paled (2018) reported a BCR of 1.83 for grafted cashew orchards, indicating profitability even under rising labour costs. The net present value (NPV) and internal rate of return (IRR) were also positive, reflecting long-term economic sustainability. Major cost factors influencing BCR included fertilizer expenditure, labour, and pest management. Sensitivity analysis revealed that profitability declines under reduced yield or increased wage conditions. However, favourable soil-climate conditions, high market prices for raw cashew nuts, and proper maintenance practices sustain a high BCR. Thus, cashew remains one of the most profitable plantation crops in the coastal Konkan belt when scientific management and improved grafts are used.

The review of literature highlights key areas in the comparative cost-benefit analysis of alphonso mango and cashew orchards. However, major research gaps remain. Limited studies focus specifically on the South Konkan region, where microclimatic, soil and market conditions significantly influence profitability. The role

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of government policies, subsidies and technological advancements in cost efficiency remains underexplored. Insights into farmer-level socio-economic factors and their decision-making processes are also insufficiently addressed, highlighting the need for region-specific, integrated economic analysis.

SCOPE OF THE STUDY

The study covers the socio-economic conditions of the alphonso mango farmers and cashew farmers, the cost of establishment and operation and maintenance of the alphonso mango orchards and cashew orchards and cost benefit ratio among the alphonso mango orchards and cashew orchards. The study is based on data for the agricultural year 2023-24.

The findings and recommendations are based on discussions with the sample mango farmers and cashew farmers. The conclusions drawn from the research are applicable to the mango and cashew crops in the area under the study and all over the Konkan region also.

OBJECTIVES OF THE STUDY

The objectives of the study are as follows:-

1) To find out the cost of establishment of the alphonso mango orchards and cashew orchards in the area under study.
2) To find out the cost of operation and maintenance of the alphonso mango orchards and cashew orchards in the area under study.
3) To find out the cost benefit ratio of the alphonso mango orchards and cashew orchards in the area under study.

HYPOTHESES OF THE STUDY

Following are the hypotheses of the study:-

Hypothesis I

H_1= The average establishment cost of the alphonso mango orchard is comparatively more than the average establishment cost of cashew orchard in the area under the study.

H_0= The average establishment cost of the alphonso mango orchard is comparatively less than the average establishment cost of cashew orchard in the area under the study.

Hypothesis II

H_1= The average operation and maintenance cost of the alphonso mango orchard is comparatively more than the average operation and maintenance cost of cashew orchard in the area under the study.

H_0= The average operation and maintenance cost of the alphonso mango orchard is comparatively less than the average operation and maintenance cost of cashew orchard in the area under the study.

Hypothesis III

H_1= The cost benefit ratio of the alphonso mango orchard is comparatively higher than the cost benefit ratio of the cashew orchard in the area under the study.

H_0= The cost benefit ratio of the alphonso mango orchard is comparatively lower than the cost benefit ratio of the cashew orchard in the area under the study.

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RESEARCH METHODOLOGY

The alphonso mango and cashew farmers from area under the study are universe of the study. In total, 180 farmers are selected by using convenience sampling method.

45 alphonso mango farmers, 5 alphonso mango farmers each from all the nine tehsils of the Ratnagiri district and 45 alphonso mango farmers, 5 alphonso mango farmers each from all the eight tehsils of the Sindhudurg district and due to the significance of Devgad alphonso, 5 extra alphonso mango farmers in the Devgad tehsil of the Sindhudurg district are selected as the sample from the lists available at the tehsil agriculture office at each tehsil. 45 cashew farmers, 5 cashew farmers each from all the nine tehsils of the Ratnagiri district and 45 cashew farmers, 5 cashew farmers each from all the eight tehsils of the Sindhudurg district and 5 extra cashew farmers in the Vengurla tehsil of the Sindhudurg district are selected as the sample from the lists available at the tehsil agriculture office at each tehsil. The convenience sampling method is used for the selection of the sample.

Primary and secondary data is used for the research. For collecting primary data, interview method and observation method is used. The primary data is related with Agricultural Year 2023-24 .For collection of secondary data, books, journals, research papers, thesis and websites are used.

The data is collected by using survey method. The selected alphonso mango farmers and cashew farmers are contacted personally and interviewed with the help of separate schedule specially designed. The researcher has observed the activities of the alphonso mango farmers and cashew farmers at their places. Various tools namely tables, charts, percentage and ratios are used for the analysis of data. The concept of Cost Benefit ratio is used for the analysis of cost related data.

ANALYSIS AND INTERPRETATION OF THE DATA

7.1 The average cost of establishment of the alphonso mango/cashew orchard (per acre) for the sample farmers

The average cost of establishment of the alphonso mango orchard (per acre) for the sample alphonso mango farmers and the sample cashew farmers is compared as under:-

7.1.1 The average cost of establishment of the alphonso mango orchard (per acre) for sample alphonso mango farmers

Table 1:- **The average cost of establishment of the alphonso mango orchard (per acre) for sample alphonso mango farmers**

Sr. No.	Particulars		Years					Total
			Ist	IInd	IIIrd	IVth	Vth	
1	Grafts ₹		8,072	1,585	0	0	0	**9,657**
		%	83.59	16.41	0	0	0	**100**
2	Labour ₹		13,630	6,152	5,012	2,852	3,043	**30,689**
		%	44.41	20.05	16.33	9.29	9.92	**100**
3	Manures ₹		4,632	2,250	2,456	2,412	2,652	**14,402**
		%	32.16	15.62	17.05	16.75	18.41	**100**
4	Fertilizers ₹		2,655	1,654	1,802	1,656	1,811	**9,578**
		%	27.72	17.27	18.81	17.29	18.91	**100**
5	Plant Protection ₹		1,612	1,410	1,464	1,620	1,867	**7,973**
		%	20.22	17.68	18.36	20.32	23.42	**100**
6	Fencing ₹		3,245	701	0	817	0	**4,763**

		%	68.13	14.72	0	17.15	0	**100**
7	Other ₹		688	422	434	405	436	**2,385**
		%	28.85	17.69	18.2	16.98	18.28	**100**
Total Cost of Establishment ₹			**34,534**	**14,174**	**11,168**	**9,762**	**9,809**	**79,447**
		%	**43.47**	**17.84**	**14.06**	**12.29**	**12.34**	**100**

(Source:-Field Survey)

Details of the year wise and element wise cost of establishment of the alphonso mango orchard per acre are collected from all the 90 sample alphonso mango farmers. The cost of establishment of the alphonso mango orchard per acre was highest during the first year as the basic infrastructure was created. As the establishment of the alphonso mango orchard is the labour intensive activity, the labour cost was the major element of the cost.

From the analysis of data collected from 90 sample alphonso mango farmers, the average cost of establishment of the alphonso mango orchard was ₹79,447. It was for the period of five years, in particular, maximum ₹34,534(43.47%) during the first year, ₹14,174 (17.84%) during the second year, ₹11,168 (14.06%) during the third year, ₹9,762 (12.29%) during the fourth year and ₹9,809 (12.34%) during the fifth year.

Total cost of establishment for the period of five years was incurred on the different elements of cost, in particular, ₹9,657 (12.16%) on grafts, maximum ₹30,689 (38.63%) on labour, ₹14,402 (18.13%) on manures, ₹9,578 (12.05%) on fertilizers, ₹7,973(10.04%) on plant protection,₹4,763(5.99%) on fencing whereas ₹2,385 (3.00%) as other expenses.

During all five years, labour was the head of the maximum expenditure having ₹13,630(39.47%) of the first, ₹6,152(43.40%) of the second, ₹5,012(44.87%) of the third, ₹2,852(29.22%) of the fourth and ₹3,043 (31.02%) of the fifth year's total expenditure.

Expenses on purchase of alphonso mango grafts were incurred during the first year and some more expenses were incurred during the second year for planting grafts at the place of the grafts which were died. Fence was prepared during the first year. During the second and the fourth year, some expenditure was made on repairing the fence. Labour, manures, fertilizers and plant protection expenses were incurred more or less during all the five years.

7.1.2 The average cost of establishment of the cashew orchard (per acre) for the sample cashew farmers:-

Table 2:- The average cost of establishment of the cashew orchard (per acre) for the sample cashew farmers

Sr.No.	**Particulars**		**Years**					**Total**
			Ist	**IInd**	**IIIrd**	**IVth**	**Vth**	
1	Grafts	₹	8,220	1,435	0	0	0	**9,655**
		%	85.14	14.86	0.0	0.0	0.0	**100.00**
2	Labour	₹	8,833	3,618	3,484	2,510	2,682	**21,127**
		%	41.81	17.13	16.49	11.88	12.69	**100.00**
3	Manures	₹	3,235	2,245	2,354	2,314	2,401	**12,549**
		%	25.78	17.89	18.76	18.44	19.13	**100.00**
4	Fertilizers	₹	2,862	1,554	1,835	1,844	1,895	**9,990**
		%	28.65	15.56	18.37	18.45	18.97	**100.00**
5	Plant Protection	₹	1,451	1,242	1,341	1,536	1,804	**7,374**
		%	19.68	16.84	18.19	20.83	24.46	**100.00**
6	Fencing	₹	3,632	712	0	870	0	**5,214**

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		%	69.66	13.66	0.0	16.68	0.0	**100.00**
7	Other	₹	672	345	356	342	348	**2,063**
		%	32.57	16.72	17.26	16.58	16.87	**100.00**
Total Cost of Establishment		₹	**28,905**	**11,151**	**9,370**	**9,416**	**9,130**	**67,972**
		%	**42.52**	**16.41**	**13.79**	**13.85**	**13.43**	**100.00**

Details of the year wise and element wise cost of establishment of the cashew orchard per acre are collected from all the 90 sample cashew farmers.

The basic infrastructure is required to be created in the first year, therefore, cost of establishment of the cashew orchard per acre was highest during the first year. As the cashew orchard is the labour intensive activity, labour cost was the major element of the cost of establishment of the cashew orchard. From the analysis of the data collected from 90 sample cashew farmers, the average cost of establishment of the cashew orchard was ₹67,972. It was for the period of five years, in particular, maximum ₹28,905(42.52%) during the first year, ₹11,151(16.41%) during the second year, ₹9,370(13.79%) during the third year, ₹9,416 (13.85%) during the fourth year and ₹9,130(13.43%) during the fifth year.

Total cost of establishment of the cashew orchard for the period of five years was incurred on the different elements of cost, in particular, ₹9,655(14.20%) on grafts, maximum ₹21,127(31.08%) on labour, ₹12,549(18.46%) on manures, ₹9,990(14.70%) on fertilizers, ₹7,374(10.85%) on plant protection, ₹5,214 (7.67%) on fencing whereas ₹2,063(3.04%) as other expenses.

During all five years, labour was the head of maximum expenditure having ₹8,833 (30.56%) of the first year's, ₹3,618(32.45%) of the second year's,₹3,484 (37.18%) of the third year's, ₹2,510 (26.66%) of the fourth year's and ₹2,682 (29.38%) of the fifth year's total expenditure.

Expenses on the purchase of cashew grafts were incurred for plantation during the first year and the second year for planting grafts at the place of the grafts which were died during the first year. Fence was prepared during the first year. Some expenditure was made on repairing the fence, during the second and the fourth year. Labour, manures, fertilizers and plant protection expenses were incurred more or less during all the five years.

Hypothesis I

H_1= The average establishment cost of the alphonso mango orchard is comparatively more than the average establishment cost of cashew orchard in the area under the study.

H_0= The average establishment cost of the alphonso mango orchard is comparatively less than the average establishment cost of cashew orchard in the area under the study.

The average establishment cost of the alphonso mango orchard (per acre) is ₹79,447 whereas average cost of establishment of the cashew orchard (per acre) is ₹67,972.

₹79,447 > ₹67,972

The average establishment cost of the alphonso mango orchard is comparatively more than the average establishment cost of cashew orchard in the area under the study.

Therefore, the Hypothesis I is accepted.

7.2 The average cost of operation and maintenance of the alphonso mango/ cashew orchard (per acre)

Details of the cost of operation and maintenance of the alphonso mango orchard per acre is collected from all the 90 sample alphonso mango farmers and the cost of operation and maintenance of the cashew orchard per acre is collected from all the 90 sample cashew farmers for the agricultural year 2023-24 by using the schedule specially designed for the purpose. The comparative study of the average cost of operation and maintenance of

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the alphonso mango orchard (per acre) and the average cost of operation and maintenance of the cashew orchard (per acre) is carried out.

The average operation and maintenance cost of the alphonso mango orchard per acre and the cashew orchard (per acre) for sample farmers has shown in the following table:-

Table 3:- The average cost of operation and maintenance of the alphonso mango orchard (per acre) and the cashew orchard (per acre)

Particulars	**Per Acre Cost of Operation and Maintenance (Absolute Figures) ₹**			**Per Acre Cost of Operation and Maintenance (Percentage)**		
	AMF	**CF**	**Difference**	**AMF**	**CF**	**Difference**
Hired labour	12,874	10,223	2,651	14.06	14.30	25.93
Manures	5,873	4,652	1,221	6.41	6.51	26.25
Fertilizers	4,875	3,217	1,658	5.33	4.50	51.54
Plant protection chemicals and growth regulators	6,122	4,630	1,492	6.69	6.48	32.22
Input Costs	**29,744**	**22,722**	**7,022**	**32.49**	**31.78**	**30.90**
Land revenue and other taxes	120	120	0	0.13	0.17	0.0
Deprecation on fixed assets and repairing charges	3,212	2,840	372	3.51	3.97	13.09
Interest on working capital	3,569	2,727	842	3.90	3.81	30.88
Cost A	**36,645**	**28,409**	**8,236**	**40.03**	**39.74**	**28.99**
Interest on fixed capital	6,412	4,982	1,430	7.00	6.97	28.70
Land rent	27,851	20,453	7,398	30.42	28.61	36.17
Amortisation value	9,541	8,163	1,378	10.42	11.42	16.88
Cost B	**80,449**	**62,007**	**18,442**	**87.88**	**86.73**	**29.74**
Family labour	8,119	7,212	907	8.87	10.08	12.58
Supervision charges	2,974	2,272	702	3.25	3.18	30.90
Cost C	**91,542**	**71,491**	**20,051**	**100.00**	**100.00**	**28.05**

(Source:-Field Survey)

Average per acre cost of operation and maintenance of the alphonso mango orchard for sample mango farmers was ₹91,542 consisting of Input Cost ₹ 29,744 (32.49%), Cost A ₹36,645 (40.03%), Cost B ₹80,449 (87.88%) and Cost C i.e. total cost ₹91,542(100.00%).

Average per acre cost of operation and maintenance of the cashew orchard for sample cashew farmers was ₹71,491 consisting of Input Cost ₹22,722(31.78%), Cost A ₹28,409(39.74%), Cost B ₹62,007(86.73%) and Cost C i.e. total cost ₹71,491(100.00%).

Average per acre Input Cost, Cost A, Cost B and Cost C of operation and maintenance of the alphonso mango orchard for sample alphonso mango farmers was more by ₹7,022(30.90%), ₹8,236(28.99%), ₹18,442(29.74%) and ₹20,051(28.05%) respectively as compared to the sample cashew farmers.

Average per acre Input Cost, Cost A, Cost B and Cost C of operation and maintenance of the alphonso mango orchard was comparatively more whereas operation and maintenance of the cashew orchard was comparatively less.

Hypothesis II

H_1= The average operation and maintenance cost of the alphonso mango orchard is comparatively more than the average operation and maintenance cost of cashew orchard in the area under the study.

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$H_{0=}$ The average operation and maintenance cost of the alphonso mango orchard is comparatively less than the average operation and maintenance cost of cashew orchard in the area under the study.

The average operation and maintenance cost of the alphonso mango orchard (per acre) for sample alphonso mango farmers is ₹91,542 whereas average operation and maintenance cost of the cashew orchard (per acre) for sample cashew farmers is ₹71,491.

₹91,542 > ₹71,491

The average operation and maintenance cost of the alphonso mango orchard is comparatively more than the average operation and maintenance cost of cashew orchard in the area under the study.

Therefore, the Hypothesis II is accepted.

7.3 The average returns from the alphonso mango/ cashew orchard (per acre)

Table 4:- Average returns from the alphonso mango/cashew orchard (per acre)

Particulars	Sample Mango Farmers		Difference	
	AMF	CF	Absolute Figures	Percentage
Total Cost ₹	91,542	71,491	20,051	28.05
Produce (Kgs)	1,814	1,633	181	11.08
Price per Kg ₹	92.12	75.15	16.97	22.58
Value of Produce ₹	1,67,106	1,22,720	44,386	36.17
Benefit Cost Ratio	1.82	1.71	0.11	6.43

(Source:-Field Survey)

The total cost of operation and maintenance for the alphonso mango orchard was ₹91,542 per acre for the alphonso mango farmers and for the cashew orchard was ₹71,491 per acre for the cashew farmers. The total cost of operation and maintenance per acre for the alphonso mango orchard for the alphonso mango farmers is ₹20,051(28.05%) more as compared to total cost of operation and maintenance per acre for the cashew orchard for the cashew farmers.

The average per acre produce of the alphonso mangoes was 1,814 Kgs for alphonso mango farmers and the average per acre produce of the cashew 1,633 Kgs for the cashew farmers. The average per acre produce of the alphonso mangoes for the alphonso mango farmers is 181 kgs (11.08%) more as compared to average per acre produce of the cashew for the cashew farmers.

The price per kg produce of the alphonso mangoes was ₹92.12 for the alphonso mango farmers and the price per kg produce of the cashew nut was ₹75.15 for the cashew farmers. The cost per acre produce of the alphonso mangoes for the alphonso mango farmers is 16.97(22.58%) more.

The value of produce of the alphonso mangoes per acre was ₹1,67,106 for the alphonso mango farmers and ₹1,22,720 for the cashew farmers. The average per acre produce of the alphonso mangoes per acre for the alphonso mango farmers is ₹44,386 (36.17%) more as compared to average per acre produce of the cashew farmers.

The benefit cost ratio of the alphonso mangoes per acre was 1.82 for the alphonso mango farmers and 1.71 for the cashew farmers. Benefit cost ratio of the alphonso mangoes per acre for the alphonso mango farmers is 0.11(6.43%) more as compared to benefit cost ratio of the cashew nut per acre for the cashew farmers.

The average per acre produce, per acre cost, value of produce and benefit cost ratio of the alphonso mangoes was comparatively more.

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Hypothesis III

H1=The Benefit Cost Ratio is comparatively higher among the alphonso mango farmers and comparatively lower among the cashew farmers.
H0= The Benefit Cost Ratio is comparatively lower among the among the alphonso mango farmers and comparatively higher among the cashew farmers.

The Benefit Cost Ratio for alphonso mango farmers is 1.82: 1 whereas the Benefit Cost Ratio for cashew farmers is 1.71: 1.

1.82 > 1.71

The Benefit Cost Ratio is comparatively higher among the alphonso mango farmers and comparatively lower among the cashew farmers.

Therefore, the Hypothesis III is accepted.

OVERALL CONCLUSION

The average establishment cost of the alphonso mango orchard is comparatively more than the average establishment cost of the cashew orchard. The average operation and maintenance cost of the mango orchard is comparatively more than the average operation and maintenance cost of the cashew orchard. The benefit cost ratio is comparatively higher among the alphonso mango farmers and comparatively lower among the cashew farmers.

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