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To estimate the costs and returns of banana cultivation in Raigarh district of Chhattisgarh state

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Abstract

The present study, conducted by Bhupendra Kumar Chandra (2025) in Raigarh district of Chhattisgarh, analyzed the economics of banana cultivation across small, medium, and large farm categories. A sample of banana growers was studied to estimate input costs, cost of cultivation under various cost concepts, returns, and benefit-cost ratios.

Results revealed that the average cost of cultivation was ₹2,77,444.70 per hectare, rising with farm size. Variable costs accounted for about 75% of the total, dominated by hired labour, planting material (₹51,504/ha; 18.6%), fertilizers (≈10%), and manures, while fixed costs (≈24%) remained stable, mainly due to the rental value of owned land (₹61,775; 22%). The average yield was 781.52 quintals/ha, generating gross returns of ₹8.23 lakh/ha.

Across cost concepts, returns were highest over Cost A1/A2 (₹6.22 lakh/ha) and lowest under the comprehensive Cost C3 (₹5.18 lakh/ha). Net returns over Cost C2 averaged ₹5.45 lakh/ha, with profitability consistently higher on larger farms. The cost of production averaged ₹355.06 per quintal. The benefit-cost ratio was most favorable at Cost A1 (1:3.09 overall) and least at Cost C3 (1:1.69 overall), while at Cost C2 it stood at 1:1.96, affirming the profitability of banana cultivation.

The study concludes that banana cultivation is a highly profitable and economically viable enterprise in Raigarh district. Efficient labour management, mechanization, and input optimization are key to further improving returns. Policy support in the form of quality planting materials, cost-effective fertilizers, and farmer training on resource-use efficiency would enhance the sustainability and competitiveness of banana production in the region.

Keywords: Banana cultivation, cost of cultivation, returns, benefit-cost ratio, Raigarh, Chhattisgarh

Introduction

Review of Literature

Pundir *et al.* (2024) [4] analysed the cost of cultivation and returns of banana crop, by the observation of 240 sampled farmers of middle Gujrat. They found different costs of cultivation the per hectare labour cost was higher (₹ 101064.60) in banana cultivation followed by manures and fertiliser cost (₹ 75008.60) and planting material charges (₹ 48888.84). Cost C2 was ₹ 396162.82 per hectare for banana cultivation. The average price received by farmers was found to be at ₹ 943.24 per quintal and gross return was ₹ 814770.71 per hectare. The net return over cost C2 was found to be ₹ 418607.90 while the benefit-cost ratio was 2.06. they concluded as Banana crop is Economically viable to the farmers.

Bhatta *et al.* (2023) [1] conducted study to examine the profitability and resource use efficiency in banana production in the Chitwan district. Categorization of banana farmers was done according to the farm size as small-scale and large-scale farmers. A total of 80 banana farmers were randomly selected, including 45 small-scale and 35 large-scale farmers. Results revealed that the average cost of production of bananas per Kattha per year was NPR 11,769.85 and the gross benefit was NPR 15,470.687 per Kattha per year. Similarly, the overall BC ratio was 1.37 showing a profitable farming business with the significant economy of scale. The return to scale was 0.699 showing a decreasing return to scale

Munusamy *et al.* (2022) [3] analysed the cost and returns of banana, by the observation of 60 sampled farmers of Kanniyakumari District of Tamil Nadu. They found that total cost of cultivation of banana per acre was Rs. 1, 34,615. The Gross Income is Rs. 2, 34,000. The Net Income is Rs.99, 385 The BCR value is 1.73. Thus it concluded that banana is economically profitable for the farmers.

Rede *et al.* (2021) [5] analysed the per ha return and cost of banana cultivation based on the information of 90 sample farmers of Solapur district, Maharashtra. They estimated that the cost of cultivation was Rs.324671.04/ha. The per hectare inputs utilized for banana at overall level were 118.58 human days, 22.67 tonnes manures, 399.60 kg N, 126.11 kg P, 720.29 kg K. Average gross income was Rs.627708.57. The gross income received in size group small, medium and large was Rs. 609142.70, Rs. 614926.70 and Rs.659056.30, respectively.

Murry and Das (2019) [2] carried out study in Wokha district of Nagaland, India. And for the observation 60 banana growers had been recognized and interviewed through the

multi degree stratified random sampling approach for the observe on the financial analysis and profitability of banana cultivation it was observed that a mean according to hectare general cost of banana cultivation was Rs. 59041.30. The variable price and fixed price shares represent Rs. 55493.83 (93.99%) and Rs. 3547.47 (6.01%) respectively. The annual average gross income was observed to Rs. 157980.33 according to hectare with a mean internet goes back of Rs. 101819.82. The benefit cost ratio over total cost was observed out to be 2.68 that is economically viable enterprise.

Methods and Materials

Sampling Procedure

The study was conducted in Raigarh district of Chhattisgarh, purposively selected for its highest banana production in the state and ranking fourth in area under banana cultivation. Out of the nine blocks in the district, three blocks—Kharsia, Pusour, and Dharamjaigarh—were purposively chosen due to their extensive banana-growing areas. From each block, eight villages with substantial banana cultivation were selected, making a total of 24 villages. The study population comprised 481 banana-growing households from these villages. A 25% sample was drawn, resulting in 120 respondents, who were further categorized into small, medium, and large farmers.

Analytical Tools

Data were analyzed using simple tabular methods along with basic statistical measures such as averages, percentages, ratios, and indices. Costs and returns from banana cultivation were evaluated through standard farm management techniques.

Standard cost concept

The standard cost method employed by the Directorate of Economics and Statistics, Government of India, was adopted to determine the cost of cultivation. The cost of cultivating bananas was presented in terms of Cost A1, Cost A2, Cost B1, Cost B2, Cost C1, Cost C2, and Cost C3. The various cost components were calculated using the following method.

Cost A1: Consist of the following items of costs

- Value of hired human labour
- Value of owned bullock labour
- Value of hired bullock labour
- Value of owned machinery operations
- Hired machinery charged
- Value of fertilizers
- Value of manure (produced on the farm and purchased)
- Value of Planting material (both farm-produced and purchased)
- Value of Plant protection materials.
- Irrigation charges
- Land revenue, cesses, and other taxes
- Depreciation on farm implements
- Depreciation on a farm building, farm machinery.
- Interest on the working capital.
- Incidental expenses.
- Repairing Charges

Cost A2: Cost A1+Rent paid for Leased in Land.
Cost B1: Cost A1+ Interest value of fixed capital assets (excluding land)
Cost B2: Cost B1 + rental value of owned land and rent paid for leased-in land.
Cost C1: Cost B1 + Imputed value of family labour.
Cost C2: Cost B2 + Imputed value of the family labour.
Cost C3: Cost C2+ value of managerial cost at the rate of 10% of cost C2.

Returns

Gross Returns: Gross returns = Net Returns + Cost of cultivation
Net Returns: Net Returns = Gross returns - Cost of Cultivation

$$\text{Cost of Production per quintal} = \frac{\text{Cost of cultivation per hectare} - \text{value of by product}}{\text{yield per hectare}}$$

Benefit cost ratio: = Net Returns/ Cost of cultivation

Results and Discussion

Economics of Banana Cultivation

Per hectare cost of banana cultivation was analyzed by farm size (small, medium, large). Variable costs (about 75% of total) dominate, mainly from hired labour, planting material, fertilizers, and manures. Family labour cost is higher on small farms, while hired labour and machinery costs rise with farm size. Planting material averages ₹51,504 (18.6%), and fertilizers alone account for nearly 10% of costs. Fixed costs (≈24%) remain stable across farm sizes, with land rental value (₹61,775) forming the largest share (22%). Total cultivation cost per hectare rises with scale: Small farms: ₹2,67,146.93, Medium farms: ₹2,78,242.52, Large farms: ₹2,86,944.78 & Overall average: ₹2,77,444.70

Table 1: Input-wise cost of cultivation of banana crop (Rs./ha)

S.N.	Particulars	Small Farmers	Medium Farmers	Large Farmers	Overall
A.	Variable Cost				
1.	Family labour	13265.68 (4.96)	9691.59 (3.48)	7456.56 (2.59)	10137.94 (3.65)
2.	Hired Human labour	49994.61 (18.71)	53125.64 (19.09)	57248.65 (19.95)	53456.30 (19.26)
3.	Machine operation	8435.70 (3.15)	9883.57 (3.55)	12869.80 (4.48)	10396.35 (3.74)
4.	Planting material	50048.86 (18.73)	52648.54 (18.92)	51815.19 (18.05)	51504.19 (18.56)
5.	Manures	13811.04 (5.16)	16133.14 (5.79)	18261.77 (6.36)	16068.65 (5.79)
6.	Fertilizer	25871.41	27985.26	29376.19	27744.28

		(9.68)	(10.05)	(10.23)	(9.99)
7.	Irrigation charges	8816.31 (3.30)	9208.58 (3.30)	9563.21 (3.33)	9196.03 (3.31)
8.	Plant protection	9878.37 (3.69)	10612.42 (3.81)	11056.26 (3.85)	10515.68 (3.79)
9.	Propping	11602.92 (4.34)	12654.28 (4.54)	12297.07 (4.28)	12184.75 (4.39)
10.	Repairing Charges	618.65 (0.23)	745.23 (0.26)	853.90 (0.29)	739.26 (0.26)
11.	Incidental charges	1000 (0.37)	1000 (0.35)	1000 (0.34)	1000 (0.36)
12.	Interest on working capital (@ 4%)	7203.09 (2.69)	7759.86 (2.78)	8173.68 (2.84)	7712.21 (2.77)
	Sub-total (Cost A)	200546.64 (75.06)	211448.11 (75.99)	219972.28 (76.66)	210655.64 (75.92)
B.	**Fixed cost**				
13.	Land revenue	25 (0.009)	25 (0.008)	25 (0.008)	25 (0.009)
14.	Depreciation	443.27 (0.16)	624.69 (0.22)	791.13 (0.27)	619.69 (0.22)
15.	Rental value of owned land	61775 (23.12)	61775 (22.20)	61775 (21.52)	61775 (22.26)
16.	Interest on fixed capital (@ of 7%)	4357.02 (1.63)	4369.72 (1.57)	4381.37 (1.52)	4369.37 (1.57)
	Sub- total (Cost B)	66600.29 (24.93)	66794.41 (24.005)	66972.50 (23.33)	66789.06 (24.07)
	Total cost (A + B)	267146.93 (100)	278242.52 (100)	286944.78 (100)	277444.70 (100)

Table 2: Cost breakup on basis of cost concept of Banana crop. (Rs./ha)

S.N.	Particulars	Small Farmers	Medium Farmers	Large Farmers	Overall
1	Cost A_1	187749.23	202406.21	213331.85	201162.39
2	Cost A_2	187749.23	202406.21	213331.85	201162.39
3	Cost B_1	192106.25	206775.93	217713.22	205531.76
4	Cost B_2	253881.25	268550.93	279488.22	267306.76
5	Cost C_1	205371.93	216467.52	225169.78	215669.70
6	Cost C_2	267146.93	278242.52	286944.78	277444.70
7	Cost C_3	293861.62	306066.77	315639.25	305189.17

Table 3: Yield, cost and returns of banana crop at the sampled Farms.(Rs./ha)

S.N.	Particulars	Small Farmers	Medium Farmers	Large Farmers	Overall
1	Main yield (qt./ha)	769.97	781.34	793.26	781.52
2	Price (Rs/qt.)	1013	1057	1089	1053
3	Gross Returns (Rs./ha)	779979.61	825876.38	863860.14	822940.56
4	Cost of cultivation at cost C_2 (Rs./ha)	267146.93	278242.52	286944.78	277444.70
5	Net Returns (Rs./ha)	512832.68	547633.86	576915.36	545495.86
6	Cost of production(Rs/qt.)	346.95	356.10	361.72	355.06
7	B:C Ratio	1:1.91	1:1.96	1:2.01	1:1.96

Returns over Costs of Banana Cultivation

Banana growers in Raigarh district earned high gross returns, but profitability varied with cost concepts. Returns over Cost A1/A2 (paid-out costs) were highest, averaging ₹6.22 lakh/ha, rising from ₹5.92 lakh on small farms to ₹6.51 lakh on large farms. With imputed costs included, returns declined: ₹6.17 lakh at Cost B1, ₹5.56 lakh at Cost B2, and ₹5.45 lakh at Cost C2 (land + family labour). The most comprehensive measure, Cost C3 (including managerial charges), gave an average of ₹5.18 lakh/ha.

Table 4: Returns over different costs of banana growers. (Rs./ha)

S.N.	Particulars	Small Farmers	Medium Farmers	Large Farmers	Overall
1	Returns over Cost A_1	592230.38	623470.17	650528.29	621778.17
2	Returns over Cost A_2	592230.38	623470.17	650528.29	621778.17
3	Returns over Cost B_1	587873.36	619100.45	646146.92	617408.80
4	Returns over Cost B_2	526098.36	557325.45	584371.92	555633.80
5	Returns over Cost C_1	574607.68	609408.86	638690.36	607270.86
6	Returns over Cost C_2	512832.68	547633.86	576915.36	545495.86
7	Returns over Cost C_3	486117.99	519809.61	548220.89	517751.39

Table 5: Benefit cost ratio at different costs of sampled Households.

S.N.	Particulars	Small Farmers	Medium Farmers	Large Farmers	Overall
1	Cost A_1	1:3.15	1:3.08	1:3.04	1:3.09
2	Cost A_2	1:3.15	1:3.08	1:3.04	1:3.09
3	Cost B_1	1:3.06	1:2.99	1:2.96	1:3.003
4	Cost B_2	1:2.07	1:2.07	1:2.09	1:2.07
5	Cost C_1	1:2.79	1:2.81	1:2.83	1:2.81
6	Cost C_2	1:1.91	1:1.96	1:2.01	1:1.96
7	Cost C_3	1:1.65	1:1.69	1:1.73	1:1.69

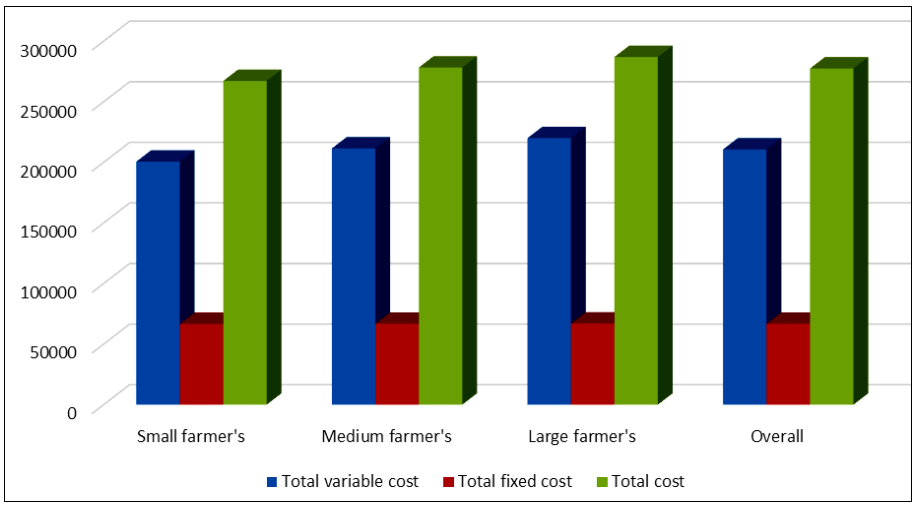

Fig 1: Total variable cost, Total fixed cost, and Total cost at Sampled households.

Summary and Conclusion

Summary

The study analyzed the economics of banana cultivation in Raigarh district across small, medium, and large farms.

- **Cost of Cultivation:** The average per hectare cost of banana cultivation was ₹2,77,444.70, increasing with farm size. Variable costs dominated (≈75%), mainly from hired labour, planting material (≈₹51,504; 18.6%), fertilizers (≈10%), and manures. Family labour contributed more on small farms, while hired labour and machinery costs rose with scale. Fixed costs (≈24%) remained stable, largely due to the rental value of owned land (₹61,775; 22%).
- **Cost Concepts:** Cost of production per quintal was lowest on small farms (₹346.95) and highest on large farms (₹361.72), with an overall average of ₹355.06. Total cost (Cost C2) ranged from ₹2.67 lakh on small farms to ₹2.87 lakh on large farms.
- **Returns:** Gross returns averaged ₹8.23 lakh/ha, increasing from ₹7.79 lakh on small farms to ₹8.64 lakh on large farms. Net returns over Cost C2 averaged ₹5.45 lakh/ha, with large farms showing the highest profitability (₹5.77 lakh/ha).
- **Returns over Costs:** Returns over Cost A1/A2 were the highest (₹6.22 lakh/ha), while the most comprehensive measure, Cost C3, yielded ₹5.18 lakh/ha. Profitability consistently improved with farm size across all cost concepts.
- **Benefit-Cost Ratio (B:C):** The B:C ratio was highest at Cost A1 (1:3.09 overall) and lowest at Cost C3 (1:1.69 overall). At Cost C2, the overall B:C ratio was 1:1.96, showing economic viability across all farm sizes.

Conclusion

Banana cultivation in Raigarh district is highly profitable, with gross and net returns demonstrating economic sustainability across all farm sizes. Although small farms incur higher family labour costs, larger farms benefit from economies of scale, achieving higher net returns and B:C ratios. Variable costs, particularly labour, planting material, and fertilizers, dominate the cost structure, while fixed costs remain constant.

The results suggest that efficient labour management, mechanization, and input optimization can further enhance profitability. Policymakers and extension agencies should focus on improving access to quality planting materials, cost-effective fertilizers, and labour-saving technologies. Strengthening farmer training on resource use efficiency can make banana cultivation more competitive and sustainable in the district.

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