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Prospects of papaya production in Raipur District of Chhattisgarh

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Abstract
The study conducted with the title "An Economic Analysis of Production of Papaya in Raipur District of Chhattisgarh.'' There are 4 blocks in Raipur district *viz*; Tilda, Arang, Abhanpur and Dharshiwa. Among them Dharshiwa and Arang were undertaken on the basis of the maximum area and production of papaya. The selected blocks total 12 villages were selected purposively for fulfillment of the objectives of study. Total sample of 45 farmers were selected randomly. Further, the respondents were categorized under marginal, small, medium and large papaya growers. Average family size was 5.27, which constitute 51.11 percent of Other Backward Class (OBC). Maximum farmers were under the age group of 18 to 40 year (45.57%) of total household and agriculture was main occupation (56.43%) in study area. Literacy rate was 96.62 percent and illiterate percentage was 3.37 percent. In the study area, major source of irrigation was tube well it covered 67.58% of land and the average cropping intensity was 244.05 percent. The total cost of cultivation in papaya was found ₹ 144854.64/ha. The Variable Cost and Fixed Cost were determined to be ₹ 114853.35/ha and ₹ 30001.28/ha, respectively, representing 79.29 percent and 20.71 percent of the total cost of cultivation. The profitability of papaya were estimated and found that input-output ratio was 1:3.55 and B: C ratio was 1:2.55, On an overall basis Gross returns (total income) was observed to the ₹ 514517.40/ha, while net returns was found to be ₹ 369662.76/ha and overall production of papaya was 635.21 quintal /ha. Marketable surplus of papaya was found highest in large farms i.e. 2216.03 quintal /farm. Maximum percentage of papaya was disposed through channel –II i.e. 98.49 percent.

Keywords: Gross returns, net returns B:C ratio, input-output ratio

Introduction
Papaya (*Carica papaya*) is an important fruit of tropical and subtropical region of the world and is known as "Melon Tree." Papaya belongs to the genus Carica of the family Caricaceae. Out of 48 species of all the species *Carica papaya* L. is the most important and best known. It is cultivated all over the world. The original home of papaya is Tropical America. The importance of papaya (*Carica papaya*) to agriculture and the world's economy is demonstrated by its wide distribution and substantial production in the tropical countries. It has long been known and cultivated in the home gardens by the people of tropics because it is one of the few fruits, which gives quick returns throughout the year and adapts itself to diverse soil and climatic conditions. Papaya production plays an important role in Chhattisgarh state. Total production of Papaya in Chhattisgarh is 381.695 thousand metric tonnes in the area of 14.155 thousand hectares in the year 2021-22. (Source-Agriportal, Directorate of Horticulture, Statistics, 2021-22).

Methodology
Sampling technique of Raipur district of Chhattisgarh was purposively chosen as the study area because, Raipur has the 2nd maximum production (41.29 thousand metric tonnes in 0.992-thousand-hectare area) of Papaya in Chhattisgarh after Durg district (51.299 thousand metric tonnes in 1.304-thousand-hectare area). Papaya has the highest production among all fruits growing in Raipur district and have better export potential with transportation facility.

Costs and returns of papaya cultivation
Despite the costs & return was worked out by old concepts, a standard method of cost of cultivation of papaya was also used.
This method is accepted by The Commission of Agricultural Costs and Prices (CACP). Under this method, the cost of cultivation was computed by using the 7 Cost concepts, which are known as cost A1, cost A2 cost B1, cost B2 and cost C1, cost C2, and cost C3.

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Cost A1: Consist of following 16 items of costs
1. Value of hired human labour (permanent and casual)
2. Value of owned bullock labour
3. Value of hired bullock labour
4. Value of owned machinery
5. Hired machinery charged
6. Value of fertilizers
7. Value of manure (produced on farm and purchased)
8. Value of seed (both farm-produced and purchased)
9. Value of insecticides and fungicides.
10. Irrigation charges (both of the owned and hired tube wells, pumping sets etc.)
11. canal-water charges
12. Land revenue, cesses and other taxes
13. Depreciation on farm implements (both of the bullock drawn and worked with human labour)
14. Depreciation on farm building, farm machinery.
15. Interest on the working capital.
16. Miscellaneous expenses (wages of artisans, and repairs to small farm implements)

Cost A2 = Cost A1 + Rent paid for Leased in Land.
Cost B1 = Cost A1 + Interest on value of Owned fixed Capital assets (excluding land)
Cost B2 = Cost B1 + Rental value of owned land
Cost C1 = Cost B1 + Imputed value of Family Labour.
Cost C2 = Cost B2 + Imputed value of Family labour.
Cost C3 = Cost C2 + 10 percent of cost C2 taking as managerial allowances.

Income over different cost
Income over cost A1 = Gross Return – Cost A1
Income over cost A2 = Gross Return – Cost A2
Income over cost B1 = Gross Return – Cost B1
Income over cost B2 = Gross Return – Cost B2
Income over cost C1 = Gross Return – Cost C1
Income over cost C2 = Gross Return – Cost C2
Income over cost C3 = Gross Return – Cost C3

Net income
It is the difference between total return and total expenses. So,
Net income = Gross income - Total expenses

Input – output ratio
It is the ratio of input and output, which is an under
Input - Output Ratio = Value of output / Value of input used

Results and Discussion
The cost and returns in papaya cultivation
Different Costs utilized in the Process of Production are studied to have a better understanding of the papaya cultivation. The results of this analysis are presented in the table no.1. According to the table no. 1, the total cost of cultivation in papaya was ₹ 144854.64/ha. The Variable Cost and Fixed Cost were determined to be ₹ 114853.35/ha and ₹ 30001.28/ha, respectively, representing 79.29 percent and 20.71 percent of the total cost of cultivation. The study found that the total cost of cultivation in papaya for marginal, small, medium and large farmers was ₹ 139667.93/ha, ₹ 148471.35/ha, ₹ 149475.89/ha and ₹ 151111.34/ha, respectively. For marginal, small and medium and large farmers the variable costs account for 78.62 percent, 79.78percent, 79.79percent and 79.84 percent respectively. Marginal, small, medium and large farmers, are, spending 21.38 percent, 20.22 percent, 20.21percent and 20.16 percent on fixed costs respectively. From the table no. 1, clearly demonstrates that human labour (hired and family labour) cost was maximum and found to be 21.27 percent followed by plant cost (19.57 percent), manure and fertilizer (17.68 percent), plant protection (7.36 percent), machine power cost (5.22 percent), interest on working capital (3.78 percent), irrigation (3.72 percent) and miscellaneous (0.69 percent).

Table 1: Cost of cultivation of papaya

Particular	Marginal	Small	Medium	Large	Overall
A. Variable cost					
1. Human labour					
a. Family labour	16524.56	15567.97	12267.41	11674.31	15233.30
	(11.83)	(10.49)	(8.21)	(7.73)	(10.52)
b. Hired labour	13867.34	15467.67	18965.45	19993.61	15579.39
	(9.93)	(10.42)	(12.69)	(13.23)	(10.76)
Total human labour	30391.90	31035.64	31232.86	31667.92	30812.70
	(21.76)	(20.90)	(20.89)	(20.96)	(21.27)
2. Machine labour	6401.12	8467.41	8511.91	8598.00	7562.77
	(4.58)	(5.70)	(5.69)	(5.69)	(5.22)
3. Plant cost (1.8 X 1.8m)	27120.61	29230.02	29460.61	29660.23	28352.62
	(19.42)	(19.69)	(19.71)	(19.63)	(19.57)
4. Manure & Fertilizer cost	24787.12	26199.39	26301.58	26650.11	25609.91
	(17.75)	(17.65)	(17.60)	(17.64)	(17.68)
5. Plant Protection Chemicals	9730.56	11346.23	11434.78	11641.11	10657.00
	(6.97)	(7.64)	(7.65)	(7.70)	(7.36)
6. Irrigation charges	5234.61	5459.02	5564.67	5599.02	5384.29
	(3.75)	(3.68)	(3.72)	(3.71)	(3.72)
7. Miscellaneous	915.67	1070.78	1082.81	1090.39	1004.85
	(0.66)	(0.72)	(0.72)	(0.72)	(0.69)
8. Interest on working capital @ 5%	5229.08	5640.42	5679.46	5745.34	5469.21
	(3.74)	(3.80)	(3.80)	(3.80)	(3.78)
Sub variable total	109810.67	118448.91	119268.68	120652.12	114853.35
	(78.62)	(79.78)	(79.79)	(79.84)	(79.29)
Fixed cost					
1. Land revenue	24	24	24	24	24.00

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	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
2. Rental value of land (prevailing rate)	25650.00	25650.00	25650.00	25650.00	25650.00
	(18.36)	(17.28)	(17.16)	(16.97)	(17.71)
3. Depreciation	1510.82	1640.33	1659.56	1867.77	1596.30
	(1.08)	(1.10)	(1.11)	(1.24)	(1.10)
4. Interest on fixed capital @10%	2672.44	2708.10	2873.65	2917.45	2730.99
	(1.91)	(1.82)	(1.92)	(1.93)	(1.89)
Subtotal fixed cost	29857.26	30022.43	30207.21	30459.22	30001.28
	(21.38)	(20.22)	(20.21)	(20.16)	(20.71)
Total cost (A+B)	139667.93	148471.35	149475.89	151111.34	144854.64
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
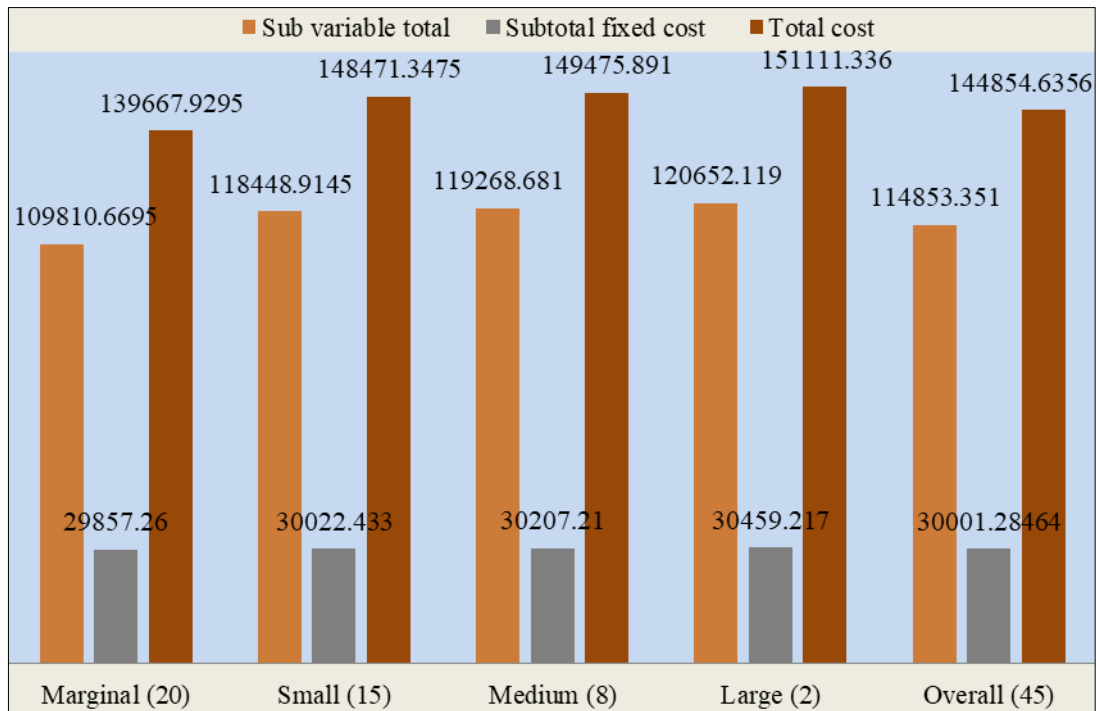
Fig 1: Total Costs of papaya cultivation of sample household

Measures of farm profit in papaya cultivation

The overall per hectare gross profits from papaya cultivation shown in table no. 2. The result was computed using the market price of ₹ 810.00 per quintal and total gross return from papaya was found to be ₹ 514517.40. The cost of production of papaya was found to be ₹ 233.20/qtl, ₹ 226.91/qtl, ₹ 221.41/qtl ₹ 217.35/qtl and ₹ 228.04/qtl, for marginal, small, medium, large and overall farms size, respectively. While overall input-output ratio and B: C ratio were found to be 1:3.55 and 1:2.55, On an overall basis net returns was found to be ₹ 369662.76/ha and overall production of papaya was 635.21 quintal /ha.

Table 2: Yield, value of output and cost of production in papaya cultivation (Rs/ha.)

Particular	Marginal	Small	Medium	Large	Overall
1. Cost of cultivation (Rs/ha)	139667.93	148471.35	149475.89	151111.34	144854.64
2. Yield main product (qtl/ha)	598.91	654.32	675.10	695.25	635.21
3. Average price (Rs/qtl)	810.00	810.00	810.00	810.00	810.00
4. Grass Income (Rs/ha)	485117.10	529999.20	546831.00	563152.50	514517.40
5. Net income (Rs/ha)	345449.17	381527.85	397355.11	412041.16	369662.76
6. Cost of production (Rs/qtl)	233.20	226.91	221.41	217.35	228.04
7. Input output ratio	1:3.47	1:3.57	1:3.66	1:3.73	!:3.55
8. B:C ratio	1:2.47	1:2.57	1:2.66	1:2.73	1:2.55

Different cost in papaya cultivation

Cost of cultivation of papaya of sample farms in the Raipur district was worked out and presented in table no. 3. It is envisaged that Cost A_1 as designated as variable cost was found to be ₹ 101240.34/ha on an overall basis, which was added of rent paid for lease in land and Cost A_2, was found to be ₹ 101240.34/ha, indicates that the interest on fixed capital imputed with Cost B_1 was ₹ 103971.33/ha. Normally, farmers are cultivating the crop in their own land but it has imputed rental value of land of ₹ 25650/ha notified Cost B_2 was ₹ 129621.33/ha. The Cost C_1 found to be ₹ 119204.64/ha, includes the value of Cost B_1 and imputed value of family labour was found to be ₹ 15233.30/ha, The Cost C_2, found to be ₹ 144854.64/ha, includes the value of Cost B_2 and imputed value of family labour and The Cost C_3, found to be ₹ 159340.10/ha, imputed value of managerial allowances at 10 percent of Cost C_2.

Table 3: Break-up of total cost obtained over different cost

Cost/ Category	Marginal	Small	Medium	Large	Overall
Cost A1	94820.93	104545.27	108684.83	110869.58	101240.34
Cost A2	94820.93	104545.27	108684.83	110869.58	101240.34
Cost B1	97493.37	107253.38	111558.48	113787.03	103971.33
Cost B2	123143.37	132903.38	137208.48	139437.03	129621.33
Cost C1	114017.93	122821.35	123825.89	125461.34	119204.64
Cost C2	139667.93	148471.35	149475.89	151111.34	144854.64
Cost C3	153634.72	163318.48	164423.48	166222.47	159340.10

Returns obtained over different cost in papaya cultivation
Table no.4. Shows that the returns over Cost A_1 was obtained to be ₹ 390296.17/ha, ₹ 425453.93/ha, ₹ 438146.17/ha, ₹ 452282.92/ha and ₹ 413277.06/ha for Marginal, Small, Medium, Large and Overall, respectively. Cost A_2, was obtained to be ₹ 390296.17, ₹ 425453.93/ha., ₹ 438146.17/ha. ₹ 452282.92/ha and ₹ 413277.06 /ha for Marginal, Small, Medium, Large and Overall, respectively. Cost B_1 was obtained to be ₹ 387623.73/ha, ₹ 422745.82/ha, ₹ 435272.52/ha, ₹ 449365.47/ha and ₹ 410546.07/ha for Marginal, Small, Medium, Large and overall, respectively. Cost B_2 was obtained to be ₹ 361973.73/ha, ₹ 397095.82/ha, ₹ 409622.52/ha, ₹ 423715.47/ha and ₹ 384896.07/ha for Marginal, Small, Medium, Large and Overall, respectively. Cost C_1 was obtained to be ₹ 371099.17/ha, ₹ 407177.85/ha, ₹ 423005.11/ha, ₹ 437691/ha.16 and ₹ 395312.76/ha for Marginal, Small, Medium Large and overall, respectively. Cost C_2 was obtained to be ₹ 345449.17/ha, ₹ 381527.85/ha, ₹ 397355.11/ha, ₹ 412041.16/ha and ₹ 369662.76/ha for Marginal, Small, Medium, Large and Overall, respectively. Cost C_3 was obtained to be ₹ 331482.38/ha, ₹ 366680.72/ha, ₹ 382407.52/ha, ₹ 396930.03/ha and ₹ 355177.30/ha, for Marginal, Small, Medium, Large and overall, respectively.

Table 4: Cost concept wise gross income over different cost in papaya crop (Rs/ha.)

Particulars	Marginal	Small	Medium	Large	Overall
Return over cost A1	390296.17	425453.93	438146.17	452282.92	413277.06
Return over cost A2	390296.17	425453.93	438146.17	452282.92	413277.06
Return over cost B1	387623.73	422745.82	435272.52	449365.47	410546.07
Return over cost B2	361973.73	397095.82	409622.52	423715.47	384896.07
Return over cost C1	371099.17	407177.85	423005.11	437691.16	395312.76
Return over cost C2	345449.17	381527.85	397355.11	412041.16	369662.76
Return over cost C3	331482.38	366680.72	382407.52	396930.03	355177.30

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