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## An economic analysis of papaya production in Durg district of Chhattisgarh

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### Abstract

The study conducted “An Economic Analysis of Production and Marketing of Papaya in Durg District of Chhattisgarh State.” There are 3 blocks in Durg district Patan, Dhamdha and Durg, from which Durg and Dhamdha blocks was selected for study. Out of the selected blocks total 14 villages was selected Durg district for fulfillment of the objectives of study. Total sample of 45 farmers were selected randomly. The respondents were classified into three groups viz., marginal (<1.00 hectares), small (1.01-2.00 hectares), medium (2.01- 4.00 hectares) and large (4.01 hectares and above) farms. The caste wise composition of sampled households was noticed that the maximum households are of General Caste (GEN) was highest 91.66 per cent. Maximum farmers’ age under 18 to 40 year covering (47.62%) of total household and agriculture is main occupation (60.55%) in study area. Literacy rate was 94.34 per cent and illiterate was 5.63 per cent. The total cost of cultivation in papaya was found ₹139397.80/ha. The Variable Cost and Fixed Cost were determined to be ₹115583.28/ha and ₹23814.52/ha, respectively, representing 82.92 per cent and 17.08 per cent of the total cost of cultivation. In the profitability of papaya were estimated and found to be at input-output ratio and B: C ratio 1:3.66 and 1:2.66, On an overall basis Gross returns (total income) was observed to the ₹510519.79/ha, while net returns was found to be ₹371121.99/ha and overall production of papaya was 634.02 quintal /ha. Marketable surplus of papaya was found highest in large farms i.e. 1617.77 quintal /farm.

**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 (Shivannavar, 2005). 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 377.382 thousand metric tonnes in an area of 13.987 thousand hectares which comprises 6.34 per cent of the total fruit production of the state in the year 2020-21. It is cultivated in almost every district of the state. Among the districts of Chhattisgarh state, Durg is the leading district in papaya production which produces 51.299 thousand metric tonnes in 1.304 thousand hectare area.

### Methodology

Sampling technique of Durg district of Chhattisgarh was purposively chosen as the study area because, it has the larger area under papaya cultivation in the district. A multistage simple random sampling technique (SRS) was adopted to select the villages and the respondents, different farmer involved in papaya production and marketing in Durg district. The details of the sampling techniques at various stages are given as under:

### 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.

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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 A<sub>1</sub>, cost A<sub>2</sub> cost B<sub>1</sub>, cost B<sub>2</sub> and cost C<sub>1</sub>, cost C<sub>2</sub>, and cost C<sub>3</sub>.

#### Cost A<sub>1</sub>: 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 A<sub>2</sub> = Cost A<sub>1</sub> + Rent paid for Leased in Land.

Cost B<sub>1</sub> = Cost A<sub>1</sub> + Interest on value of Owned fixed Capital assets (excluding land)

Cost B<sub>2</sub> = Cost B<sub>1</sub> + Rental value of owned land

Cost C<sub>1</sub> = Cost B<sub>1</sub> + Imputed value of Family Labour.

Cost C<sub>2</sub> = Cost B<sub>2</sub> + Imputed value of Family labour.

Cost C<sub>3</sub> = Cost C<sub>2</sub> + 10 per cent of cost C<sub>2</sub> taking as managerial allowances.

#### Income over different cost

Income over cost A<sub>1</sub> = Gross Return – Cost A<sub>1</sub>

Income over cost A<sub>2</sub> = Gross Return – Cost A<sub>2</sub>

Income over cost B<sub>1</sub> = Gross Return – Cost B<sub>1</sub>

Income over cost B<sub>2</sub> = Gross Return – Cost B<sub>2</sub>

Income over cost C<sub>1</sub> = Gross Return – Cost C<sub>1</sub>

Income over cost C<sub>2</sub> = Gross Return – Cost C<sub>2</sub>

Income over cost C<sub>3</sub> = Gross Return – Cost C<sub>3</sub>

#### 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 of papaya in the study area

##### Cost of cultivation

Different Costs utilized in the Process of Production are studied to have a better understanding of the cost of papaya cultivation. The results of this analysis are presented in the table below. According to the table 1, the total cost of cultivation in papaya was ₹139397.80/ha. The Variable Cost and Fixed Cost were determined to be ₹115583.28/ha and ₹23814.52/ha, respectively, representing 82.92 per cent and 17.08 per cent of the total cost of cultivation. It was also found that the total cost of cultivation in papaya for marginal, small, medium and large farmers was ₹136432.26/ha, ₹140286.19/ha, ₹141330.90/ha and ₹144338.20/ha, respectively. For marginal, small and medium and large farmers the variable costs account for 83.40 per cent, 82.66 per cent, 82.62 per cent and 82.86 per cent respectively. Marginal, small, medium and large farmers, are, spending 16.60 per cent, 17.34 per cent, 17.38 per cent and 17.14 per cent on fixed costs respectively. From the table 1, it is clearly demonstrates that human labour (hired and family labour) cost was maximum and found to be 23.51 per cent followed by plant cost (20.00 per cent), manure and fertilizer (18.19 per cent), plant protection (7.74 per cent), machine power cost (5.27 per cent), irrigation (3.81 per cent), interest on working capital (2.83 per cent) and miscellaneous (0.76 per cent). The cost of family labour is decreasing with the increase in farm size.

**Table 1:** Cost on different heads of papaya in the Durg district (Rs./ha)

Particulars	Marginal	Small	Medium	Large	Overall
<b>A. Variable cost</b>					
<b>1. Human labour</b>					
Family labour	18018.75	16339.29	14465.38	13075.00	16250.00
	(13.21)	(11.65)	(10.24)	(9.06)	(11.66)
Hired labour	14606.25	16446.43	18403.85	20250.00	16526.67
	(10.71)	(11.72)	(13.02)	(14.03)	(11.86)
Total human labour	32625.00	32785.71	32869.23	33325.00	32776.67
	(23.91)	(23.37)	(23.26)	(23.09)	(23.51)
Machine charge	7311.88	7356.43	7372.31	7480.00	7350.67
	(5.36)	(5.24)	(5.22)	(5.18)	(5.27)
Plant cost (1.8 X 1.8m)	27340.31	28160.36	28180.38	28350.00	27883.00
	(20.04)	(20.07)	(19.94)	(19.64)	(20.00)
Manure & Fertilizer cost	25974.31	26311.64	26916.38	28700.00	26472.56
	(19.04)	(18.76)	(19.04)	(19.88)	(18.99)
Plant Protection Chemicals	10262.50	11071.43	11076.92	11100.00	10786.67
	(7.52)	(7.89)	(7.84)	(7.69)	(7.74)
Irrigation charges	5369.22	5265.54	5285.38	5450.00	5316.33
	(3.94)	(3.75)	(3.74)	(3.78)	(3.81)
Miscellaneous	1041.88	1051.43	1066.92	1090.00	1054.22
	(0.76)	(0.75)	(0.75)	(0.76)	(0.76)
Interest on working capital	3865.00	3960.84	3994.92	4108.50	3943.17

	(2.83)	(2.82)	(2.83)	(2.85)	(2.83)
Total variable cost	113790.10	115963.38	116762.45	119603.50	115583.28
	(83.40)	(82.66)	(82.62)	(82.86)	(82.92)
<b>B. Fixed cost</b>					
Land revenue	12	12	12	12	12
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Rental value of land	20462.50	21985.71	22200.00	22350.00	21522.22
	(15.00)	(15.67)	(15.71)	(15.48)	(15.44)
Depreciation	120.21	125.33	135.25	136.5	126.87
	(0.09)	(0.09)	(0.10)	(0.09)	(0.09)
Interest on fixed capital	2047.45	2199.77	2221.20	2236.20	2153.42
	(1.50)	(1.57)	(1.57)	(1.55)	(1.54)
Total fixed cost	22642.16	24322.82	24568.45	24734.7	23814.52
	(16.60)	(17.34)	(17.38)	(17.14)	(17.08)
Total cost (A+B)	136432.26	140286.19	141330.90	144338.20	139397.80
	100	100	100	100	100

Note: Figure in parenthesis was percentage to the total cost of cultivation.

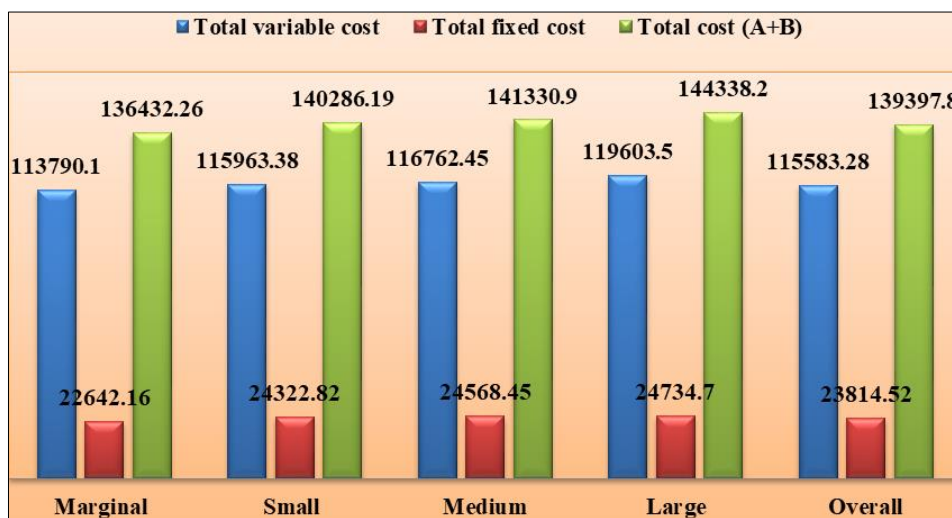


Fig 1: Total Costs of papaya cultivation of sampled household in Durg district

**Measures of farm profit in papaya cultivation in Durg district**

The overall per hectare gross profits from papaya cultivation were computed using the market price of ₹805.10 per quintal and total gross return from papaya was found to be ₹510519.79. The cost of production of papaya was found to be ₹228.87/qlt, ₹215.78/qlt, ₹215.39/qlt, ₹212.11/qlt and

₹219.86/qlt for marginal, small, medium, large and overall farms size, respectively. While overall input-output ratio and B: C ratio were found to be 1:3.66 and 1:2.66, On an overall basis Gross returns (total income) was observed to the ₹510519.79/ha, while net returns was found to be ₹371121.99/ha and overall production of papaya was 634.02 quintal /ha (Table 2).

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

Particular	Marginal	Small	Medium	Large	Overall
Cost of cultivation (Rs/ha)	136432.26	140286.19	141330.90	144338.20	139397.80
Yield (qtl/ha)	596.13	650.14	656.15	680.50	634.02
Price (Rs/qtl)	802.12	804.50	808.62	810.20	805.10
Gross return (Rs/ha)	478163.79	523039.93	530579.12	551341.10	510519.79
Net return (Rs/ha)	341731.53	382753.74	389248.22	407002.90	371121.99
Cost of production (Rs/qtl)	228.87	215.78	215.39	212.11	219.86
Input Output Ratio	1:3.50	1:3.73	1:3.75	1:3.82	1:3.66
B:C ratio	1:2.50	1:2.73	1:2.75	1:2.82	1:2.66

**Cost obtain on the basis of different cost concept of papaya in Durg district**

Cost of cultivation of papaya of sample farms in the Durg district has been worked out and presented in table 1. It is envisaged that Cost A<sub>1</sub> as designated as variable cost was found to be ₹99472.16/ha on an overall basis, which was added of rent paid for lease in land and Cost A<sub>2</sub>, was found to be ₹99472.16/ha, indicates that the interest on fixed capital imputed with Cost B<sub>1</sub> was ₹101625.58/ha. Normally, farmers

are cultivating the crop in their own land but it has imputed rental value of land of ₹21522.22/ha notified Cost B<sub>2</sub> was ₹123147.80/ha. The Cost C<sub>1</sub> found to be ₹117875.58/ha, includes the value of Cost B<sub>1</sub> and imputed value of family labour was found to be ₹16250.00/ha, The Cost C<sub>2</sub>, found to be ₹139397.80/ha, includes the value of Cost B<sub>2</sub> and imputed value of family labour and The Cost C<sub>3</sub>, found to be Rs 153337.58/ha, imputed value of managerial allowances at 10 per cent of Cost C<sub>2</sub> (Table 3).

**Table 3:** Break-up of total cost obtained over different cost (Rs./ha)

Cost/Category	Marginal	Small	Medium	Large	Overall
Cost A <sub>1</sub>	95903.56	99761.42	102444.32	106677.00	99472.16
Cost A <sub>2</sub>	95903.56	99761.42	102444.32	106677.00	99472.16
Cost B <sub>1</sub>	97951.01	101961.19	104665.52	108913.20	101625.58
Cost B <sub>2</sub>	118413.51	123946.91	126865.52	131263.20	123147.80
Cost C <sub>1</sub>	115969.76	118300.48	119130.90	121988.20	117875.58
Cost C <sub>2</sub>	136432.26	140286.19	141330.90	144338.20	139397.80
Cost C <sub>3</sub>	150075.48	154314.81	155463.99	158772.02	153337.58

### Return obtained over different cost of papaya in Durg district

Table 3 shows that the overall returns over Cost A<sub>1</sub>, Cost A<sub>2</sub>, Cost B<sub>1</sub>, Cost B<sub>2</sub>, Cost C<sub>1</sub>, Cost C<sub>2</sub>, and Cost C<sub>3</sub> was obtained

to be ₹411047.63/ha, ₹411047.63/ha, ₹408894.21/ha, ₹387371.99/ha, ₹392644.21/ha, ₹371121.99/ha and ₹357182.21/ha, respectively.

**Table 3:** Cost concept wise gross income over different cost in papaya crop (Rs/ha.)

Particulars	Marginal	Small	Medium	Large	Overall
Return over cost A <sub>1</sub>	382260.23	423278.51	428134.80	444664.10	411047.63
Return over cost A <sub>2</sub>	382260.23	423278.51	428134.80	444664.10	411047.63
Return over cost B <sub>1</sub>	380212.78	421078.74	425913.60	442427.90	408894.21
Return over cost B <sub>2</sub>	359750.28	399093.02	403713.60	420077.90	387371.99
Return over cost C <sub>1</sub>	362194.03	404739.45	411448.22	429352.90	392644.21
Return over cost C <sub>2</sub>	341731.53	382753.74	389248.22	407002.90	371121.99
Return over cost C <sub>3</sub>	328088.30	368725.12	375115.13	392569.08	357182.21

### Suggestions

The some suggestions for the papaya growers are planting materials should be selected carefully so as to maintain proper plant population in later stages. Proper cultivation practices should be followed in accordance with the latest techniques. Small scale processing units for producing processed products from papaya will ultimately help the producers for making money and this will also reduce the problem of unemployment for youth in villages and also will encourage women empowerment. Easy and efficient finance service from different financing agencies is very important to promote area and production of papaya is study area. Efficient use of input and resources so as to gain maximum output with minimum cost.

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