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An economic analysis of Rajeshwari (Igkv- R₁) variety of paddy in plain zone of Chhattisgarh state

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Abstract

The present study finite to the for an economic analysis of Rajeshwari (IGKV- R₁) variety of paddy in plains zone of three districts from Chhattisgarh state. Two villages from each blocks and 1 block from each district namely Rajnandgaon, Mahasamund and Dhamtari districts were selected purposively on the basis of higher area and production in paddy cultivation. A multistage sampling design was used which consists five stages. Twenty cultivators from all twelve villages were selected randomly from each village. This led to a total sample size to 240 farmers. The primary data was collected from the sampled farmers through personal interview method on schedule designed for the study. The overall cost of cultivation was found to be ₹/ha 43314.01 it seems a increasing trend with increasing the size of farms. The major cost incurred in the cultivation of IGKV R₁ variety of rice in input wise analysis method was the total human labour uses contribute 26.58 percent and in operation wise cost analysis manuring and fertilizer uses contribute the 18.99 percent cost to the total cost. The overall main yield of this variety found to be 39.92 q/ha. that laid the main income to ₹ 58678.73 at the rate of ₹/q 1470. The overall gross income, net income and input output ratio were ₹/ha 63728.54, ₹/ha 20413.19 and 1.47 respectively.

Keywords: Paddy, economic analysis, rajeshwari (IGKV- R₁) and cost of cultivation

Introduction

The food grains requirement of India by 2020 will be between 257 and 296 million tons (Mt) depending on income growth (Kumar 1998; Bhalla *et al.* 1999). The demand for rice is expected to increase to 122 Mt, by 2020 assuming a medium income growth (Kumar 1998). This will have to be produced from the same or even shrinking land resource. Thus, by 2020 the average yields of rice need to be increased by about 60%. Similar is the scenario for many other crops. Although, there is a pressure to increase production, lately, there has been a significant slow-down of the growth rate in the cultivated area, production and yield.

Paddy is one of the most important cereal crops in the country. Chhattisgarh is recognized as rice bowl in India. The state's share to national paddy area and production is 8.61 percent and 6.30 percent respectively. Chhattisgarh is the paddy dominated mono-cropped state with more than 80 percent kharif cultivable area under paddy. Direct seeded, Line sowing & Broadcasting, transplanting, system of rice intensification (SRI) etc. are the main methods of sowing of paddy. About 70 percent farmers go for direct seeding of paddy by broadcasting method in Chhattisgarh. The yield levels of the state are very low at 1322 kg/ha compared to national average of 2390 kg/ha. During 2015-16. The area under irrigated paddy is only about 26 percent.

Looking to these facts, the present study was undertaken to work out the cost and returns in cultivation of paddy in the study area.

Methodology

For conducting the above study three districts from Chhattisgarh plain zone of Chhattisgarh state namely Rajnandgaon, Mahasamund and Dhamtari districts were selected purposively. Rajeshwari (IGKV- R₁) rice variety was selected for the study because this is a new improved variety developed by Indira Gandhi Krishi vishwavidyalaya Raipur. And has occupied more than 20 percent cultivated area of total paddy cultivation in respective districts. A multistage sampling design was used which consists five stages. Two blocks from each district were Chhuikhadan and Rajnandgoan blocks from Rajnandgoan district, Dhamtri and Kurud blocks from Dhamtri district and Saraipali and Basna blocks from Mahasamund district were selected randomly for the study. Thereafter two villages from each block and twenty cultivators from all twelve villages were selected randomly from each village. This led to a total sample size to 240 farmers. The primary data was collected from the sampled farmers through personal

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interview method on schedule designed for the study. The perceptions of farmers were taken about the constraints on varieties grown, productivity of rice technology adoption in cultivar. The primary data belongs to the crop year 2016-17. Achieving the above objectives the standard method for estimation of cost incurred in cultivation of paddy recommended by CACP was used.

Which are following:

Cost A₁: All actual expenses in cash and kind incurred in production by owner.

Cost A₂: Cost A₁+rent paid for leased in land.

Cost B₁: Cost A₁+interest on value of owned capital assets (excluding land)

Cost B₂: Cost B₁+rental value of owned land (net of land revenue) + rent paid for leased in 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 (accounts as management cost)

Cost of production

Cost of production = Cost of cultivation/Quantity of Product

Income measures

Following income measure were used:

Gross Income

It is the total value of main product as well as of by product:

$$GI = (Q_m \times P_m) + (Q_b \times P_b)$$

Where,

GI = Gross income

Q_m = Quantity of main product

P_m = Price of main product

Q_b = Quantity of by product

P_b = Price of by Product

Net returns over variable cost

It is the return over variable cost. It is work out after deducting the total variable cost from gross income. It is also used in judging the relative importance of each component of variable cost.

Net return over variable cost = Gross returns - Total variable cost.

Net returns

It is very important to identify whether farmers are making profit or incurring loss, in cultivation of crops. It was calculated by subtracting the total cost from the gross returns.

Net return = Gross return – Total cost.

Result and discussion

Cost of cultivation of paddy crop in sample households

The cost of cultivation, cost of inputs, cost of operation wise at different farms and the returns realized from this crop across the farms are presented under following sub- sections.

Input wise cost of cultivation

The cost of inputs used for paddy cultivation under different sample farms was estimated in rupees per hectare, which is presented in Table 1 The Table reveals that average, cost of input used for paddy was found to be ₹/ha 29924.92 per hectare which varies from ₹/ha 25955.26 per hectare at marginal farms to ₹/ha 34020.01 per hectare at large farm. The average share of human labour cost was noticed to be ₹/ha 11513.62 which was 26.58 percent. The maximum hired

human labour cost was observed under large farms followed by medium farms, small farms and marginal farms, where family labour decrease with increase in size of farm. The average family and hired labour observed was ₹/ha 4615.48 per hectare (10.66 percent to the total cost of inputs) and ₹/ha 6898.14 per hectare (15.93 percent to the total cost of inputs).

Table 1 shows that share of total human labour was the maximum to the total input cost for paddy followed by total bullock and machine labour (10.36 percent to the total), fertilizer cost (9.02 percent to the total), manures (7.07 percent to the total), then plant protection chemicals and the minimum cost observed was herbicide chemicals (0.89 percent to the total) followed by Zink sulphat and micro nutrient cost (0.64 percent to the total). The input cost for cultivation of paddy showed a rising trend with the farm size holdings. It was due to the fact that the large farmers could be incurred more expenditure on modern farm inputs like quality seed, fertilizer, plant protection material, hired labour etc.

Operation wise cost of cultivation

The variable cost of Paddy production at sample farms is presented in Table 2, the per hectare cost of cultivation at sample farms was ₹/ha 39243.87, ₹/ha 41557.65, ₹/ha 44869.71 and ₹/ha 47584.80 at marginal, small, medium and large farms respectively, exhibiting increasing trend with increasing farm size. The average cost of cultivation was estimated as ₹/ha 43314.01. It also reveals that the overall cost of manuring and fertilizer was costliest operation *i.e.* ₹/ha 8224.43 which was 18.99 percent to the total cost, in paddy cultivation. which varies from 18.86 percent at marginal to 18.40 percent at large farms to the total cost of cultivation. Followed by sowing was major cost spending operation. On an average cost spent on sowing was ₹/ha 4131.17 per ha which was 9.54 percent to the total. It varies from ₹ /ha 3073.84 per ha at marginal to ₹/ha 5348.9 per ha at large farms. Harvesting and threshing (9.15 percent) operation was used by combiner in medium and large farm thus less cost bear of comparison of marginal and small farms. Other major operation followed were plant protection chemical (8.00 percent), field preparation (7.40 percent), intercultural operation which was 5.24 percent to the total cost of cultivation. It indicates that overall share of fixed cost was 30.91 percent to the total cost of cultivation of Paddy and the rental value of land contributed about 95 percent to the total fixed cost which was ₹/ha 12545 per hectare. Overall fixed cost estimated was ₹/ha 13389.09 which varies from ₹/ha 13288.61 (33.86 percent) at marginal to ₹ /ha 13564.79 (28.51 percent) at large farms. The data shows that fixed cost increases with increase in size of farm. Irrespective of farm rental value of owned land contribute maximum for total fixed cost and also comparatively higher cost to the total cost of cultivation when compare to each operation separately.

Cost and returns

The cost and returns on the basis of cost concept in the production of paddy has been presented in Table 3, that, on an average cost-A₁, cost-B₁, cost-B₂, cost-C₁, cost-C₂, and cost-C₃ were worked out to ₹/ha 25637.73, ₹/ha 26152.70, ₹/ha 38698.53, ₹/ha 30768.18 per hectare, ₹/ha 43314.01 per hectare, and ₹/ha 47645.41, respectively on the sample farms. It was noted that rupees ₹/ha 12545 were considered as imputed rental value of owned land for crop season. It was found to be comparatively higher cost incurred on cultivation by large farms than other farms in the study area followed by medium, small and marginal farms. It also shows that capital

spending on production increases with increasing farm size, this was because large farmer purchase more inputs for every season which were required for production of crop and also income source at large farms enable them to purchase costlier inputs as well hiring the labours for performing different activities in the farms.

Measure of Farm profit

A measure of farm profit is presented in the Table 4, the overall yield was worked out as 39.92 quintal per ha which ranges from about 35.82 quintal per ha at marginal farms to 44.63 quintal per ha at large farms. The overall gross income was observed as ₹/ha 63642.79 in the study area which ranges from ₹/ha 56855.40 at marginal farms, to ₹/ha 71184.85 at

large farms. On an average net income calculated was ₹/ha 23608.06 which ranges from ₹/ha 17600.29 at marginal farms to ₹/ha 23608.06 at large farms. Family labour income by separating Cost B from gross income was ₹/ha 24944.26 which ranges from ₹/ha 24767.04 at marginal farms to ₹/ha 25763.09 at large farms respectively. Average farm business income was ₹/ha 38005.05, ranges from ₹/ha 37823.97 at marginal farms to ₹/ha 38830.64 at large farms. Average farm investment income was found to be ₹/ha 33388.24 in sample house-holds and table also reveal that a large farm has higher farm investment income followed medium, small and marginal farms. Average returns per rupees or input – output ratio was 1:1.47 which ranges from 1:1.45 at marginal farm to 1:1.50 at large farms.

Table 1: Input wise cost for cultivation (₹/ha)

S. No.	Particulars	Farm size				Overall
		Marginal	Small	Medium	Large	
A. Input Cost						
1.	Human Labour					
a.	Family	7155.51 (18.23)	5537.59 (13.33)	3605.78 (8.04)	2163.04 (4.55)	4615.48 (10.66)
b.	Hired	3392.39 (8.64)	5296.31 (12.74)	7919.04 (17.65)	10984.83 (23.08)	5537.4 (15.93)
2.	Total Human Labour	10547.90 (26.88)	10833.90 (26.07)	11524.82 (25.69)	13147.87 (27.63)	11513.62 (26.58)
3.	Bullock Labour	522.32 (1.33)	386.24 (0.93)	364.38 (0.59)	0.00 (0.00)	293.24 (0.68)
4.	Machine Labour	3416.39 (8.71)	3738.11 (8.99)	4454.75 (9.93)	5166.36 (10.86)	4193.90 (9.68)
5.	Total Power Labour	3938.71 (10.04)	4124.35 (9.92)	4719.13 (10.52)	5166.36 (10.86)	4487.14 (10.36)
6.	Total Labour Cost	14486.61 (36.91)	14958.25 (35.99)	16243.95 (36.20)	18314.23 (38.49)	16000.76 (36.94)
7.	Seed	2231.82 (5.69)	2173.60 (5.23)	1863.09 (4.15)	1706.62 (3.59)	1993.78 (4.60)
8.	Manures	2382.68 (6.07)	3062.51 (7.37)	3370.25 (7.51)	3426.34 (7.20)	3060.45 (7.07)
9.	Fertilizers					
a.	Urea	1033.68 (2.63)	1126.23 (2.71)	1306.85 (2.91)	1294.34 (2.72)	1190.28 (2.75)
b.	D.A.P.	2130.38 (5.43)	2284.75 (5.50)	2328.86 (5.19)	2430.13 (5.11)	2293.53 (5.30)
c.	Potash	303.14 (0.77)	438.09 (1.05)	453.11 (1.01)	490.11 (1.03)	421.11 (0.97)
10.	Total Fertilizers	3467.20 (8.84)	3849.07 (9.26)	4088.82 (9.11)	4214.58 (8.86)	3904.92 (9.02)
11.	Zink Sulphat and Micro Nutrient	0.00 (0.00)	266.00 (0.64)	375.23 (0.83)	466.25 (0.98)	276.87 (0.64)
12.	Herbicide	0.00 (0.00)	0.00 (0.00)	745.75 (1.66)	802.44 (1.68)	387.05 (0.89)
13.	Plant Protection chemicals	2359.02 (6.01)	2710.25 (6.52)	3044.84 (6.79)	3127.22 (6.57)	2810.33 (6.49)
14.	Irrigation Charges	780.56 (1.99)	941.93 (2.27)	1365.33 (3.04)	1543.16 (3.24)	1157.75 (2.67)
15.	Interest on Working Capital @4%	247.37 (0.63)	298.99 (0.72)	366.55 (0.82)	419.17 (0.88)	333.02 (0.77)
	Sub Total	25955.26 (66.14)	28260.60 (68.00)	31463.81 (70.12)	34020.01 (71.49)	29924.92 (69.09)
B. Fixed Cost						
14.	Land Revenue	12.00 (0.03)	12.00 (0.03)	12.00 (0.03)	12.00 (0.03)	12.00 (0.03)
15.	Interest on Fixed Capital @12%	511.10 (1.30)	511.43 (1.23)	515.61 (1.15)	521.72 (1.10)	514.97 (1.19)
16.	Depreciation	219.68 (0.56)	227.80 (0.55)	332.46 (0.74)	485.24 (1.02)	316.30 (0.73)
17.	Rental Value of owned Land	12546.00 (31.97)	12546.00 (30.19)	12546.00 (27.96)	12546.00 (26.37)	12546.00 (28.96)
18.	Sub Total	13288.61 (33.86)	13297.06 (32.00)	13405.90 (29.88)	13564.79 (28.51)	13389.09 (30.91)
C.	Total Input Cost (A+B)	39243.87 (100.00)	41557.65 (100.00)	44869.71 (100.00)	47584.80 (100.00)	43314.01 (100.00)

Note: figures in the parenthesis indicate percentages to the total Input cost

Table 2: Operation wise cost of cultivation (₹/ha)

S. No.	Operations	Farm size				Overall
		Marginal	Small	Medium	Large	
A						
Variable Cost						
1.	Field Preparation	2465.65 (6.28)	2636.16 (6.34)	3264.58 (7.28)	4447.8 (9.35)	3203.54 (7.40)
2.	Manure & Fertilizer	7402.37 (18.86)	8243.28 (19.84)	8496.47 (18.94)	8755.60 (18.40)	8224.43 (18.99)
3.	Nursery Preparation	264.61 (0.67)	314.17 (0.76)	445.75 (0.99)	502.44 (1.06)	381.74 (0.88)
4.	Transplanting/ Sowing	3073.84 (7.83)	3506.33 (8.44)	4595.64 (10.24)	5348.90 (11.24)	4131.17 (9.54)
5.	Intercultural Operations	2257.45 (5.75)	2453.57 (5.90)	2167.37 (4.83)	2193.11 (4.61)	2267.88 (5.24)
6.	Herbicide	0.00 (0.00)	0.00 (0.00)	1015.75 (2.26)	1072.44 (2.25)	522.05 (1.21)
7.	Irrigation	915.56 (2.32)	1261.61 (3.04)	1750.33 (3.90)	2091.16 (4.39)	1504.67 (3.47)
8.	Plant Protection	3351.62 (8.54)	3452.75 (8.31)	3454.80 (7.70)	3593.82 (7.55)	3463.25 (8.00)
9.	Harvesting & Threshing	4094.95 (10.43)	4028.23 (9.69)	3920.73 (8.74)	3804.07 (7.99)	3961.995 (9.15)
10.	Winnowing & Packing	1129.43 (2.88)	1285.78 (3.09)	1193.61 (2.66)	954.45 (2.01)	1140.82 (2.63)
11.	Transportation	752.41 (1.92)	779.73 (1.88)	792.23 (1.77)	837.05 (1.76)	790.35 (1.82)
12.	Interest on Working Capital @4%	247.37 (0.63)	298.99 (0.72)	366.55 (0.82)	419.17 (0.88)	333.02 (0.77)
	Sub total	25955.26 (66.14)	28260.60 (68.00)	31463.81 (70.12)	34020.01 (71.49)	29924.92 (69.09)

B. Fixed cost						
13.	Land revenue	12.00 (0.03)	12.00 (0.03)	12.00 (0.03)	12.00 (0.03)	12.00 (0.03)
14.	Depreciation	219.68 (0.56)	227.80 (0.55)	332.46 (0.74)	485.24 (1.02)	316.30 (0.73)
15.	Rental value of Land	12546.00 (31.97)	12546.00 (30.19)	12546.00 (27.96)	12546.00 (26.37)	12546.00 (28.96)
16.	Interest on fixed capital	511.10 (1.30)	511.43 (1.23)	515.61 (1.15)	521.72 (1.10)	514.97 (1.19)
17.	Sub Total	13288.61 (33.86)	13297.06 (32.00)	13405.90 (29.88)	13564.79 (28.51)	13389.09 (30.91)
	Total	39243.87 (100.00)	41557.65 (100.00)	44869.71 (100.00)	47584.80 (100.00)	43314.01 (100.00)

Note: figures in the parenthesis indicate percentages to the total cost

Table 3: Different cost concepts in paddy cultivation (₹/ha)

S. No.	Particulars	Marginal	Small	Medium	Large	Overall
1.	Cost A ₁	19031.43	2262.81	28202.49	32354.21	25637.73
2.	Cost B ₁	19542.53	23474.23	28718.10	32875.93	26152.70
3.	Cost B ₂	32088.36	36020.06	41263.93	45421.76	38698.53
4.	Cost C ₁	26698.04	29011.82	32323.88	35038.97	30768.18
5.	Cost C ₂	39243.87	41557.65	44869.71	47584.80	43314.01
6.	Cost C ₃	43168.25	45713.42	49356.69	52343.28	47645.41

Table 4: Measure of Farm profit of paddy in sample house-holds (₹/ha)

S. No	Particulars	Marginal	Small	Medium	Large	Overall
1.	Main yield	35.82	37.64	41.58	44.63	39.92
	Income @ 1470	52655.40	55330.80	61122.60	65606.10	58678.73
2.	Byproduct yield	42.00	52.23	51.98	55.79	50.50
	Income @ 100	4200.00	5223.00	5197.50	5578.75	5049.81
3.	Gross income	56855.40	60553.80	66320.10	71184.85	63728.54
4.	Cost of cultivation	39255.11	41562.18	44867.30	47576.79	43314.01
5.	Net income	17600.29	18991.62	21452.80	23608.06	20413.19
6.	Family labour income	24767.04	24533.74	25056.17	25763.09	25030.01
7.	Farm business income	37823.97	37590.99	38117.61	38830.64	38090.80
8.	Farm investment income	30657.22	32048.87	34514.24	36675.61	33473.99
9.	Input-output ratio	1.45	1.46	1.48	1.50	1.47

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