



AN ECONOMIC ANALYSIS OF RICE CULTIVATION AND CONSTRAINT IN DHAMTARI DISTRICT OF CHHATTISGARH, INDIA

Dwarikadhish Churpal*, A. K. Koshta and V. K. Choudhary

Department of Agricultural Economics, Indira Gandhi Krishi Vishwavidalya Raipur - 492 012 (C.G.), India.

Abstract

The share of Agriculture in GDP of state was 12.9%, which achieved the 7.6% growth in the 11th five year plan. The state has contributed the major share in production of cereals. Among cereals, rice is main crop and cultivated in 3.6 m. ha area of the state. A study on economic analysis of production and their constraints in cultivation of rice of Dhamtari district of the state was conducted during 2014-15. The study covered four villages of Dhamtari block and primary data on all the relevant aspects were collected from 40 farmers. This study was specifically carried out for Mahamaya variety of rice, which used for preparation of flakes rice. Formal survey method was used to augment data from sample of Mahamaya rice variety growers. The findings of the study revealed that the average farm size of sample farms was registered to be 2.47 ha. Overall, cost of cultivation of Mahamaya rice variety was accounted Rs./ha 37090.31, which comprised of 61.14 per cent of labour cost followed by input material cost (32.56%) and fixed cost (6.30%), respectively. Overall, yield of Mahamaya rice variety was recorded to be 55.79 q/ha. The gross return of Rs./ha 87432.40 was obtained from Mahamaya rice variety. Input output ratio was found to be 1:2.36. The major constraint in cultivation of rice was as pest and disease followed by weed problem and labour non-availability.

Keywords : Costs and return of rice, profit of rice, mahamaya rice, Dhamtari rice production and production constraints of rice.

Introduction

India occupied 41.85 m. ha area under rice crop and production of 133.70 m. tones. It is the major staple food of the country. Chhattisgarh State is well known as a rice bowl of India and rice is grown in more than 80% of the total cropped area. The majority of rice area brought under rainfed rice ecosystem. Among the 27 districts of Chhattisgarh State, Dhamtari district having nearly 200% cropping intensity and Rice- Rice- Fallow cropping pattern is prominent in the district. The district is 11th in position of area and 4th place in production of the state (Anonymous, 2013-14).

Mahamaya variety next to Swarna variety of rice is grown in area of Dhamtari district. Mahamaya variety having some desirable traits to attract the farmers for its cultivation. This variety having great industrial importance for preparation for Poha (flakes rice) or Murra and having good market value. The adoptability of Mahamaya both rainfed and irrigated ecological situation of the state. Therefore, a present study was undertaken to analyze the economics of rice cultivation and constraints during the production faced by farmers of Dhamtari district.

Materials and Methods

The study was confined to Dhamtari district of Chhattisgarh State because rice was grown in both *Kharif* & *Rabi* seasons and more number of rice mills under operation that have greater requirement of Mahamaya variety of rice to mills. Out of four block of the district, Dhamtari block was selected randomly; five hundred twenty villages were spread in North, South, East and West directions of Dhamtari block. Among them, 10 farmers of Mahamaya rice variety growers were selected randomly from each direction of the block thus, totally 40 Mahamaya rice variety grower farmers were for the study. The primary data were collected on well structured schedule design from sample farmers on all the relevant aspects to fulfill the objectives of study. The primary data were pertaining for *Kharif* season of agriculture year 2014. The simple averages and percentage statistical tools were applied to analyze the data and report the results/outcomes of the study.

Input output ratio = Gross income / Total cost.

Benefit-cost = Net income / Total cost.

*Author for correspondence - E-mail : dwarika143.dc@gmail.com

Results and Discussion

Average farm size and area under as Mahamaya rice variety

It is essential to understand the area under paddy as well as percentage area under Mahamaya rice variety of sample farms of the study area and same is presented in table 1. It reveals that average farm size of sample farms was registered to be 2.47 ha. The average farm size was noticed to be 0.92 ha at marginal farms, 1.70 ha at small farm, 3.35 ha at medium farms and 8.36 ha area large farms, respectively. The area under paddy crop was accounted more than 94 per cent, irrespective to the farm size of holdings. While, it was found the maximum at marginal farms and to be 98.91 per cent area under paddy, which was followed by large farms (98.90%), small farms (96.47%) and medium farms (91.34%), respectively.

Mahamaya rice variety area found to be 60.68 per cent to the total paddy area, irrespective to the farms size of holdings. The area of Mahamaya was noticed the maximum at marginal farms and found to be 72.53 per cent area followed by small farms (65.85%), medium farms (60.13%) and large farms (50.97%), respectively. It confirms that the state has recognized as rice bowl of India and Mahamaya rice variety are being growing by formers in the major area looking to their market value and industrial importance.

Input materials cost for cultivation of rice

The input materials cost for cultivation of Mahamaya variety of rice was worked out in Rs./ha, which is presented in table 2. It reveals that overall, input materials cost was accounted Rs./ha 12076.71. The cost of fertilizers was noticed to be the highest Rs./ha 4712.77 and shared 39.02 per cent to the total input materials cost followed by farm yard manure (38.22%), plant protection chemicals (11.03%), seed (10.07%) and interest on working capital (1.65%), respectively. The total input materials cost was ranging from Rs/ha 11582.76 at marginal farms to Rs/ha 12887.27 at large farms. It can be inferred from results that total input materials cost was increasing with increases the farm size of holdings. Overall, yield of rice was found to be 55.79 q/ha and 57.79 q/ha and by – product of Mahamaya variety of rice. It was recorded the maximum at large farm and found to be 59.28 q/ha and 61.28 q/ha of main and by – product, respectively.

Labour use cost for cultivation of paddy

It is essential to account the total cost on labour use per hectare for cultivation of paddy especially Mahamaya variety of rice. Therefore, labour use cost was worked

Table 1: Average farm size and cultivated area of sample farms. (in ha)

Farm size	No. of sample farm	Average farm size	Area under padd*	Area under Mahamaya**
Marginal	10	0.92	0.91(98.91)	0.66(72.53)
Small	16	1.70	1.64(96.47)	1.08(65.85)
Medium	11	3.35	3.06(91.34)	1.84(60.13)
Large	3	8.36	8.26(98.90)	4.21(50.97)
Total	40	2.47	2.34(94.74)	1.42(60.68)

Note: *Figures in parenthesis indicates the percentages area of paddy to average farm size.

**Figures in parenthesis indicates the percentages area of Mahamaya rice variety to the area under paddy.

out in Rs/ha and presented in table 3. Overall, the hired labour cost was registered to be Rs./ha 7177.23 and imputed value of family labour cost was noticed to be Rs./ha 13628.98. The share of hired and family labour cost to the total labour cost was found to be 34.50 and 65.50 per cent, respectively. The hired labour cost for cultivation of paddy was ranging from Rs./ha 4015.39 to Rs./ha 14851.75, irrespective to farm size of holding. The use of hired labour cost was increasing with increases in the farm size of holdings while it was just opposite in use of family labour cost it was found to be decreasing with increases in the farm size of holdings. The total labour cost was the maximum on sowing/transplanting the crop and found to be 53.96 per cent followed by harvesting (48.39%), threshing (23.66%), interculture operations (19.43%), application of plant protection chemicals (9.44%), field preparation (8.86%), application of manure/fertilizers (8.01%), transportation (5.79%) and irrigation charges (3.68%), respectively. The major operations in paddy cultivation were sowing/transplanting and harvesting the crop that performed by human labour, which was induce the cast of Rs./ha 5921.83 and Rs./ha 5437.70, respectively. The share of family and hired labour use cost to the total cost of sowing/transplanting was 57.56 and 42.44 per cent. However, the share of family and hired labour cost to the total cost of harvesting was 61.76 and 38.24 per cent, respectively. It indicates that family owned labour was participated more in the major operation of paddy cultivation than that of hired labour. Out of the total cost of cultivation of paddy, bullock/machine use cost was shared 8.25 per cent and accounted Rs./ha 1871.10. It was the highest at large farms *i.e.* Rs. 2099.50 followed by medium (Rs./ha 1937.78), small (Rs./ha 1852.50) and marginal (Rs./ha 1758.99), respectively.

Table 2 : Input material cost of cultivation of paddy.

(in ha)

S. no.	Particular	Farm size				
		Marginal	Small	Medium	Large	Overall
Yield:	Main product (q/ha)	52.12	56.66	56.92	59.28	55.79
	By product (q/ha)	54.12	58.66	58.92	61.28	57.79
A	Input materials cost					
1	Seed	1173.2 (10.13)	1265.88 (10.34)	1201.32 (9.96)	1152.67 (8.94)	1216.47 (10.07)
2	Manures	4409.3 (38.07)	4634.69 (37.85)	4669.77 (38.72)	5010.33 (38.88)	4616.16 (38.22)
C	Fertilizer					
	Urea	1086.60 (9.38)	1111.30 (9.08)	1148.35 (9.52)	1234.78 (9.58)	1124.58 (9.31)
	Phosphorus	2848.04 (24.59)	2951.61 (24.10)	3003.39 (24.90)	3106.95 (24.11)	2951.61 (24.44)
	Potash	615.27 (5.31)	643.23 (5.25)	629.25 (5.22)	699.17 (5.43)	636.59 (5.27)
	Total of fertilizer cost	4549.91 (39.28)	4706.14 (38.43)	4780.99 (39.64)	5040.90 (39.11)	4712.77 (39.02)
D	Plant protection chemicals	1288.4 (11.12)	1443.75 (11.79)	1192.58 (9.89)	1401.39 (10.87)	1332.66 (11.03)
E	Interest of working capital	161.90 (1.40)	194.62 (1.59)	215.14 (1.78)	281.98 (2.19)	198.64 (1.65)
	Total	11582.76 (100)	12245.08 (100)	12059.80 (100)	12887.27 (100)	12076.71 (100)

Note: Figures in parenthesis indicate percentage to total input material cost. Market price of main product was @ Rs./q 1360 and by product @ Rs./q 200.

Fixed cost for the cultivation of paddy

The fixed cost comprised of land revenue & taxes, depreciation on land & building and interest on fixed capital, which was worked out in Rs./ha and given in table 4. It reveals that fixed cost was increasing as increases in the farm size, which was found to be Rs./ha 831.22, Rs./ha 804.74, Rs./ha 4497.17 and Rs./ha 7598.17 at marginal, small, medium and large farms, respectively. The higher fixed cost was noticed at medium and large farms because of their owned tractors. The overall fixed cost on paddy cultivation accounted to be Rs./ha 2336.29. Overall, depreciation on land and building was found to be highest, which shared to 68.47 per cent to the total fixed cost followed by interest on fixed capital (21.80%), and land revenue and taxes (9.73%). The revenue and taxes to the total cost were found to be the same at all categories of farms. While depreciation were notice to be increasing with increases in farm size. The fixed cost for the cultivation of paddy was ranging from Rs./ha

831.22 to Rs./ha 7598.17 with irrespective to farm size of holdings.

Costs and return of cultivation of rice

The cost for cultivation of Mahamaya variety of rice is given in table 5. Overall, cost of cultivation of paddy was accounted Rs./ha 37090.31, which shared of input materials cost by 32.56%, labour cost 61.14% and fixed cost by 6.30%, respectively Neeleppa, 2002 and Tarar 2007 has also been noticed the similar findings. The cost of cultivation of rice was ranging from Rs./ha 33689.73 to Rs./ha 46378.12 irrespective to farm size of holdings.

On an average obtained gross income of sample farm in paddy cultivation was Rs./ha 87432.40, which was ranges from Rs./ha 81707.20 at marginal farms to Rs./ha 92876.80 at large farms. The net income was received Rs./ha 50342.09 by sample farms which was ranges from Rs./ha 48017.47 at marginal farms to Rs./ha 46498.68 at large farms (Mohandas and Thomas, 1997; Suneetha *et*

Table 3 : Labour cost.

Operations	Farm size													
	Marginal			Small			Medium			Large			Overall	
	Family labour	Hired labour		Family labour	Hired labour		Family labour	Hired labour		Family labour	Hired labour		Family labour	Hired labour
Field preparation	1075 (6.51)			1100 (7.53)	100 (1.35)		1137.5 (8.64)	120 (1.10)		1082.5 (10.51)	332.5 (2.13)		1102.75 (7.68)	97.94 (1.18)
Manure/fertilizer application	876 (5.31)	-		1032.8 (7.07)	-		1080 (8.21)	186 (1.71)		1019.6 (9.90)	433 (2.78)		1005.59 (7.00)	83.63 (1.01)
Sowing / transplanting	3600 (21.81)	2081 (43.64)		3800 (26.00)	2004.5 (27.05)		3028 (23.01)	3147 (28.97)		2075 (20.15)	4347 (27.88)		3408.33 (23.73)	2513.5 (30.23)
Intercultural operation	1500 (9.09)	673.6 (14.13)		1450 (9.92)	742.12 (10.01)		1150 (8.74)	1073 (9.88)		1482 (14.39)	741 (4.75)		1382.4 (9.62)	815.90 (9.81)
Irrigation	400.14 (2.42)	-		426.07 (2.92)	-		437.86 (3.33)	134.73 (1.24)		123.5 (1.20)	494 (3.17)		400.14 (2.79)	74.10 (0.89)
Plant protection	1457.3 (8.83)	61.75 (1.29)		1148.06 (7.86)	77.19 (1.04)		1223.77 (9.30)	-		823.33 (7.99)	411.67 (2.64)		1221.84 (8.51)	77.19 (0.93)
Harvesting	4492.93 (27.22)	326.04 (6.84)		3396.25 (23.24)	1798.47 (24.27)		2851.73 (21.67)	3076.27 (28.32)		1235 (11.99)	5763.33 (36.96)		3358.58 (23.38)	2079.12 (25.01)
Threshing	1500 (9.09)	723 (15.16)		1196.5 (8.19)	1150 (15.52)		1125 (8.55)	1715.5 (15.79)		850 (8.25)	1928.75 (12.37)		1226.73 (8.54)	1257.17 (15.12)
Transportation	600 (3.63)	150 (3.15)		600 (4.11)	150 (2.02)		414 (3.15)	186 (1.71)		250.5 (2.43)	400.5 (2.57)		522.64 (3.64)	178.69 (2.15)
Sub total	15501.37 (93.91)	4015.39 (84.20)		14149.68 (96.83)	6022.28 (81.25)		12447.86 (94.58)	9638.5 (88.73)		8941.43 (86.81)	14851.75 (95.25)		13628.98 (94.88)	7177.23 (86.33)
Bullock/machinery labour	1005.64 (6.09)	753.35 (15.80)		463.12 (3.17)	1389.38 (18.75)		714 (5.42)	1223.78 (11.27)		1358.5 (13.19)	741 (4.75)		734.90 (5.12)	1136.20 (13.67)
Total labour	16507.01 (100)	4768.74 (100)		14612.80 (100)	7411.66 (100)		13161.86 (100)	10862.28 (100)		10299.93 (100)	15592.75 (100)		14363.88 (100)	8313.43 (100)

Note : Figures in parenthesis indicates percentage to total labour cost.

Table 4 : Fixed cost for cultivation of paddy.

(Rs/ha)

B	Fixed cost	Farm size				
		Marginal	Small	Medium	Large	Overall
1	Land revenue and taxes	227.24(27.34)	227.24(28.24)	227.24(5.05)	227.24(2.99)	227.24(9.73)
2	Depreciation on land and building	129(15.52)	103.12(12.81)	3711.36(82.53)	6741.66(88.73)	1599.75(68.47)
3	Interest on fixed capital	474.98(57.14)	474.38(58.95)	558.57(12.42)	629.27(8.28)	509.30(21.80)
	Total fixed cost	831.22(100)	804.74(100)	4497.17(100)	7598.17(100)	2336.29(100)

Note: Figures in parenthesis indicate percentage to total fixed cost.

Table 5 : Costs and return of cultivation of paddy.

(in ha)

S. no.	Particulars	Farm size				
		Marginal	Small	Medium	Large	Overall
A	Total costs on					
1	Input-materials cost	11582.76(34.38)	12245.08(34.91)	12059.8(29.72)	12887.27(27.72)	12076.71(32.56)
2	Labour use cost	21275.75(63.15)	22024.46(62.79)	24024.14(59.20)	25892.68(55.83)	22677.31(61.14)
3	Fixed cost	831.22(2.48)	804.74(2.29)	4497.17(11.08)	7598.17(16.38)	2336.29(6.30)
	Total cost	33689.73(100)	35074.28(100)	40581.11(100)	46378.12(100)	37090.31(100)
B	Returns					
1	Gross income	81707.20	88789.60	89195.20	92876.80	87432.40
2	Net income	48017.47	53715.32	48617.09	46498.68	50342.09
3	Input – Output ratio	1:2.42	1:2.53	1:2.20	1:2.00	1:2.36
4	Benefit - Cost ratio	1.42	1.53	1.20	1.00	1.36
5	Cost per quintal of production	646.39	619.03	712.95	782.36	664.82

Note: Figures in parenthesis indicates the percentages of total cost of cultivation of Mahamaya a rice variety.

al., 2013). It indicates that cultivation of paddy is profitable.

The result of return on per rupee investment confirms that it has gone down when increases the farm size. The return on per rupee investment was the maximum at small farms and found to be 1:2.53 followed by marginal farms (1:2.42), medium farms (1:2.20) and minimum at large farms (1:2.00). Output – input ratio on average farm size was registered to be 1:2.36.

Overall, cost of production per quintal of rice cultivation was registered to be Rs./q 664.82, which was ranging from Rs./q 646.39 to Rs./q 782.36 across the farm size.

Constraints in production of rice

The opinion of farmers with respect to constraints in production of rice have taken on types of rainfall distribution, occurrence of disease & pest, weed infestation & deficiency of soil fertility, drought faced. However, under input constraints on availability of seeds, labour, manure & fertilizer, irrigation were asked to the

farmers. The opinion of farmers with regards to constraints on availability of bullock & tractor power and technological constraints have taken (table 6). The elicitation of farmers with regards to production constraints, infestation of insect was the main problem in cultivation of rice as reported by 78 per cent farmers (Nirmala and Muthuraman, 2009). Infestation of disease to the crops was the next problems, which was reported by 63.5 per cent farmers. Weeds were third problem in the cultivation of rice, which was reported by 56 per cent farmers. Soil toxicity, rainfall and submergence were also reported by farmers of study area, which were reported by 53, 41.25 and 27 per cent farmers, respectively.

In case of availability of inputs, labour availability was the main constraints in cultivation of rice, which was reported by 48 per cent farmers followed by fertilizer (47%), non-availability of seed (46%). Farm yard manure and irrigation was not timely available as reported by 45 per cent and 30 per cent farmers, respectively. The non-availability of technology was the major problem *i.e.*

Table 6 : Constraints faced by farmers during the cultivation of paddy.

S. no.	Particulars no. of farmers	Farm size of holding				
		Marginal 10	Small 16	Medium 11	Large 3	Overall 40
A	Agricultural production constraints					
1	Submergence	4 (10)	6 (37)	3 (27)	1 (33)	3.5 (27)
2	Rainfall	5 (50)	6 (37)	5 (45)	1 (33)	4.25 (41.25)
3	Diseases	7 (70)	7 (44)	8 (73)	2 (67)	6 (63.5)
4	Insects	8 (80)	8 (50)	9 (82)	3 (100)	7 (78)
5	Weeds	6 (60)	7 (44)	6 (54)	2 (67)	5.25 (56)
6	Soil toxicity	5 (50)	8 (50)	5 (45)	2 (67)	5 (53)
B	Input constraints					
1	Seed	4 (40)	4 (25)	6 (54)	2 (67)	4 (46)
2	Labour	3 (30)	5 (31)	7 (64)	2 (67)	4.25 (48)
3	Irrigation	4 (40)	7 (44)	4 (36)	-	3.75 (30)
4	Farm yard manure	3 (30)	5 (31)	6 (54)	2 (67)	4 (45)
5	Fertilizer	5 (50)	8 (50)	6 (54)	1 (33)	5 (47)
C	Power constraints					
1	Tractor	2 (20)	3 (19)	2 (18)	1 (33)	2 (38.09)
2	Bullock	3 (30)	4 (25)	4 (36)	1 (33)	3 (24)
3	Technology constraints	6 (60)	7 (44)	5 (45)	2 (67)	5.25 (54)

Notes: 1. Perceptions of farmers elicited on various constraints, but mentioned only those constrains, which was reported by the farmers. 2. Figures in parenthesis indicates percentage to total number of farmers.

reported by 54 per cent farmers followed by tractors 38.09 per cent and bullock pair was other constraints reported by 24 per cent by farmers.

Conclusion

Mahamaya variety of rice is profitable than that of other rice varieties due to having industrial importance for preparation of flakes rice/poha in the study area. The obtained net return was Rs./ha 50342.09 and input-output ratio was noticed to be 1:2.36. The possibilities to increase the productivity of Mahamaya variety to supplement with modern technologies to the farmers. The productivity of crop restricted by infestation of pest and disease to the crops, which was reported by 78 and 63.50 per cent farmers, respectively. Weed infestation was third major problem in the cultivation of rice which was reported by 56 per cent farmers.

References

- Anonymous (2010). *Directorate of Economics and Statistics*. Department of agriculture and cooperation, Ministry of Agriculture government of India. 2010
- Anonymous (2013-14). *Economic Survey of Chhattisgarh*. Ministry of Agriculture government of India.
- Krishna (2001). Sustainability and economic efficiency of price forming in the agro ecological problem area zone of Kerala, *M.Sc. (Agri.) Thesis*, submitted to University of Agricultural Sciences, Dharwad, India.
- Mohandas, K. and E. K. Thomas (1997). Economic analysis of rice production in Kuttanad areas of Kerala. *Agricultural Situation in India*, **54(9)** : 555-560.
- Neelappa (2002). Technical and allocative efficiency of paddy production in TBP area- An economic analysis, *M. Sc. (Agri.) Thesis*, submitted to University of Agricultural Sciences, Dharwad, India.
- Nirmala, B. and P. Muthuraman (2009). Economic and Constraint Analysis of Rice Cultivation in Kaithal District of Haryana. *Indian Research Journal of Extension Education*, **9(1)** : 47-49.
- Suneetha, K. and Nagendra I. Kumar (2013). Cost and returns structure of paddy in Andhra Pradesh. *Indian Journal of Research*, **3(5)** : 40 – 42.
- Tarar, N. K. (2007). Comparative economics of *Kharif* and Summer Paddy production in Durg district of Chhattisgarh, *M.Sc. (Ag.) Thesis*, submitted to Indira Gandhi Krishi Vishwavidalaya, Raipur, India.