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AN ECONOMIC ANALYSIS OF HYBRID PADDY CULTIVATION IN HARDOI DISTRICT OF UTTAR PRADESH

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ABSTRACT: Paddy (Oryza sativa) is one of the most important cereal crops and serves as a staple food for more than half of the world's population. As a member of the Poaceae family, paddy is cultivated extensively in tropical and subtropical regions, contributing significantly to global food security. The purposive-cum-multistage stratified random sampling design was used for the selection of district, block, villages, and respondents. Hardoi district of Uttar Pradesh was selected purposively to avoid the operational inconvenience of investigator and to avoid difficulties for the collection of data due to shortage of time and budget constraints. The data was pertained to the agriculture year 2024– 25. The study indicates that calculated value of cost C_3 came to Rs.74454.56, 83758.44 and 90620.83 on marginal, small, and medium size group of farms, respectively along with average value i.e., Rs.77815.66. Overall average costs like cost A_1/A_2, cost B_1, cost B_2, cost C_1 and cost C_2 came to Rs. 49998.45, 53318.98, 63677.13, 60383.37, 70741.53 per hectare, respectively. The gross income per hectare was recorded highest under medium farms i.e., Rs.154465.85 followed by small farms Rs.153065.73 and marginal farms Rs.142556.54 respectively. On an overall average, gross income came to Rs.145717.94 whereas average net income came to Rs.67902.27 per hectare. Cost of production per quintal of paddy was computed to be Rs.1149.12, Rs.1242.30 and Rs.1336.01 on marginal, small, and medium farms, respectively with an average of Rs.1185.28. Benefit-Cost ratio related to cost C_3 was highest on marginal farms (1:1.91) followed by small farms (1:1.82) and medium farms (1:1.70) with an Average Benefit-Cost ratio on cost A_1/A_2, cost B_1, cost B_2, cost C_1, cost C_2 and cost C_3 were worked out and came to 1:2.91, 1:2.75, 1:2.30, 1:2.41, 1:2.06 and 1:1.87, respectively.

KEY WORDS: Paddy, cultivation, production, cost concept, farm income measures and benefit-cost ratio.

The most significant stable food grain in the world is paddy (Oryza sativa L.) and it plays a significant role in the national economy. India is the largest producer of both white and brown rice in the world, producing 20 per cent of the world's rice. Rice (paddy, Oryza sativa), which is also known as 'Global Grains,' is cultivated in 117 countries, making it one of the oldest crops. Taking the top spot among grown cereals, it is one of the most significant staple meals for most of the world's population (60 percent), which is one of the most significant meals. It is being grown in many agro-climatic environments. The largest area (44 million hectares) is planted with rice in India, which also ranks second in production (132 million tonnes) after China (Fertilizer Statistics, New Delhi, 2004-2005). The genus Oryza contains 22 wild species in addition to two cultivated species of rice. The two species that are grown are Oryza sativa and Oryza glaberrima. While Oryza sativa is produced around the world, Oryza glaberrima is raised in West Africa. Although many other accepted techniques around the world. Rice is the sole cereal crop that will thrive in standing water for prolonged periods of time. Rice is mostly farmed on irrigated land (57 per cent), followed by rain-fed lowland (25 per cent), uplands (10 per cent), deep water (6 per cent), and tidal wetlands (2 per cent). (S. Jain 2024), In 2021, a global analysis of paddy cultivation and production, measured in million hectares and million tonnes respectively, revealed key insights into agricultural land use and output. India dedicated the largest area to paddy cultivation, total 46.27 million hectares. However, China led in overall production 212.84 million tonnes, closely followed by India's significant 194.20 million tonnes. Examining land productivity, China demonstrated the highest yield at 7113 kg per hectare, notably surpassing India's yield of 4196 kg per hectare. This resulted in China holding the largest share of global paddy production at 26.97 per cent with India contributing the second-largest portion at 24.61 per cent. The data underscores the prominent role of Asian countries in global paddy cultivation

and production. Furthermore, the considerable variations in yield across these nations highlight the diverse efficiencies in agricultural practices and resource utilization in paddy farming worldwide. Over 100 nations presently farm rice, the total area under paddy cultivation was 166.31 million hectares. which results in an annual paddy production of more than 789.04 million tonnes (Food and Agriculture Organization Corporate statistical data base 2023), overall yield was found 4744 kg/ha out of which 15 nations produce 90 per cent of the world's rice harvest. Only India and China grow 50 per cent of the world's paddy. Asia accounts for 90 per cent of the world's total paddy output, along with Bangladesh, Indonesia, Myanmar, Vietnam, Thailand, Japan, Cambodia, the Philippines, Pakistan, Nepal, the Republic of Korea, and Sri Lanka. The United States, Brazil, Madagascar, Nigeria and Egypt are other significant non-Asian paddy producing nations that collectively produce 5 per cent of the world's paddy. During the Kharif season of 2024–25, the total cultivated area under paddy in India was 43.41 million hectares and the production was estimated at 121.85 million tonnes, with an average productivity of 2807 kg/ha (Ministry of Agriculture & Farmers Welfare, Government of India 2024–25). Among the major producing states, Uttar Pradesh had the largest area under paddy cultivation, covering 7.23 million hectares, contributing 16.6 per cent to the national total, and produced 20.24 million tonnes of paddy with a productivity of 2802 kg/ha. Punjab, despite having a relatively smaller area of 3.24 million hectares (7.5 per cent), contributed significantly to total production with 14.35 million tonnes (11.8 per cent), owing to the highest productivity among all states at 4428 kg/ha. West Bengal accounted for 4.24 million hectares (9.7 per cent) and produced 11.74 million tonnes (9.6 per cent), with a productivity of 2768 kg/ha. In Telangana, the area under paddy was 2.49 million hectares (5.7 per cent), and production was estimated at 9.05 million tonnes (7.4 per cent), supported by a high productivity level of 3639 kg/ha. Chhattisgarh recorded 3.91 million hectares (9.0 per cent) of cultivated area with 8.36 million tonnes (6.9 per cent) of production, but its productivity remained lower at 2139 kg/ha. The remaining states collectively cultivated 9.67 million hectares, contributing 39.03 million tonnes of production, with an average productivity of 2187 kg/ha. (Ministry of Agriculture & Farmers' Welfare, Government of India 2024–25). In the agricultural year 2021–22, the total area under rice cultivation in Hardoi district of U.P was recorded at approximately 153323 hectares. The total production during this period was estimated at 404433 metric tonnes. Consequently, the average productivity of rice in the district stood at about 2638 kilo grams per hectare. (Statistical Bulletins: 2022-23).

RESEARCH METHODOLOGY

The purposive-cum multi-stage stratified random sampling design was used for the selection of district, block, villages, and respondents. The Hardoi district of Uttar Pradesh was selected purposively to due maximum paddy cultivated area. The district Hardoi have nineteen blocks. Of the total Behandar block was selected randomly. A list of the 80-hybrid paddy cultivating farmers of the five selected villages were selected randomly with the help of Block development Officer. Of the total ten per cent of the farmers were selected for the study. The selected farmers were categories into three farm size groups based on their size of holding. Thus, these farm holding are categorized as Marginal (< 1.0 ha), small (1.0 – 2.0 ha) and medium (2.0 – 4.0 ha). The primary data were collected through personal interview method on well-structured pre-tested schedule specially designed for this study, while secondary data were collected from published/unpublished record of District and Blocks, Headquarters, Books, Journals, Periodicals, News bulletins research paper and internet etc. The data was pertained to the agriculture year 2024– 25.

RESULTS AND DISCUSSION

The per hectare cost on various input factors in hybrid paddy cultivation was worked out and its details are presented in the table 1. This table indicates that on an overall average per hectare cost of cultivation of hybrid paddy was Rs.77815.66. The cost of cultivation was observed higher on medium farm Rs.90620.83 followed by small farm Rs.83758.44 and marginal farm Rs.74454.56, respectively. The cost of cultivation showed positive relationship with the size of farms. Total cost on medium farm was observed maximum due to heavy expenditure incorporated use of especially on tractor/machinery, seed, rental value of land and interest on fixed capital were found to be 18689.74, Rs.5865.68, 11954.20, 13224.74, respectively. The further distribution of the cost on different components indicates that maximum expenditure was involved on tractor / machinery constituted the highest cost, amounted (20.55) per cent of the total cost. This was closely followed by human labour (20.46) per cent, rental value of land (13.31) per cent, Manure and fertilizer (11.96) per cent, irrigation expenses (9.35) per cent, seed (6.86) per cent, interest

on fixed capital (4.27) per cent, plant protection (2.01) per cent.

Table-2 indicate that calculate value of cost C_3 came to Rs.74454.56, 83758.44 and 90620.83 on marginal, small and medium group of farms, respectively along with an average value i.e., Rs.77815.66. Overall average costs like cost A_1/A_2, cost B_1, cost B_2, cost C_1 and cost C_2 came to Rs.49998.45, 53318.98, 63677.13, 60383.37, 70741.53 per hectare, respectively.

Per hectare gross income was recorded highest under medium farms i.e., Rs.154465.85 followed by small farms Rs.153065.73 and marginal farms Rs.142556.54 respectively. On an overall average, gross income came to Rs.145717.94 whereas average net income came to Rs.67902.27 per hectare. Interestingly, the net income was highest on small farms Rs.69307.27 due to efficient use of resources followed by marginal farms Rs.68101.98 and medium farms Rs.63845.02. On an average family labour income, farm investment income and farm business income were observed to Rs.82040.84, Rs.88655.09 and Rs.95719.48, respectively. Family labour income was highest on marginal farms Rs.83197.83 followed by small farm Rs.81708.75 and medium farm Rs.82040.80. Farm investment income was highest on medium farms Rs.96902.21 followed by small farm Rs.93148.03 and marginal farms Rs.86315.26 and farm business income was highest on medium farms Rs.99238.54 followed by small farms Rs.97935.11 and marginal farms Rs.94642.53.Cost of production per quintal of hybrid paddy was computed to be Rs.1149.12, Rs.1242.30 and Rs.1336.01 on marginal, small and medium farms, respectively with an average of Rs.1185.28. Overall average benefit-cost ratio based on Cost A_1 /A_2, Cost B_1, Cost B_2, Cost C_1, Cost C_2 and Cost C_3 were 1: 2.91, 1: 2.75, 1: 2.30, 1: 2.41, 1: 2.06 and 1: 1.87, respectively. Benefit-Cost ratio related to cost C_3 was highest on marginal farms (1:1.91) followed by small farms (1:1.82) and medium farms (1:1.70). In respect of cost C_2, Benefit-Cost ratio was highest on marginal farms (1:2.10) followed by small farms (1:2.01) and medium farms (1:1.87). In respect of Cost C_1, Benefit-Cost ratio (1:2.41) was observed highest on marginal farms (1:2.47) followed by small farms (1:2.35) and small farms (1:2.18). In respect of cost B_2, Benefit-Cost ratio was found highest on marginal farms (1:2.40) followed by small farms (1:2.14) and medium farms (1:1.92) whereas, in cost B1 the Benefit-Cost ratio was highest on marginal farms (1:2.88) followed by small farms (1:2.53) and medium farms (1:2.25). In respect to Benefit-Cost ratio of Cost A_1/A_2, was highest on marginal farms (1:2.97) followed by small farms (1:2.77) and medium farms (1:2.79), respectively (B. Chaitanya et. al. 2020).

Table-1: Per hectare cost of different inputs used in hybrid paddy crop on different size group of sample farms (Rs. /ha.):

S. No.	Particulars	Average size of sample farms			Overall Average
		Marginal (< 1.0 ha)	Small (1.0–2.0 ha)	Medium (2.0– 4.0 ha)	
1	**Human Labour**	**15949.81 (21.42)**	**16851.43 (20.12)**	**13990.22 (15.44)**	**15922.90 (20.46)**
a.	Family Labour	8327.27 (11.18)	4787.08 (5.72)	2336.33 (2.58)	7064.39 (9.08)
b.	Hired Labour	7622.54 (10.24)	12064.35 (14.40)	11653.89 (12.86)	8858.51 (11.38)
2	Tractor/ machinery	15338.18 (20.60)	17037.12 (20.34)	18689.74 (20.62)	15991.88 (20.55)
3	Seed	5181.81 (6.96)	5634.47(6.73)	5865.68 (6.47)	5335.07 (6.86)
4	Manure & Fertilizer	9397.34 (12.62)	9174.28 (10.95)	8908.14 (9.83)	9306.59 (11.96)
5	Irrigation	7202.23 (9.67)	7820.94 (9.34)	6812.87 (7.52)	7279.30 (9.35)
6	Plant Protection	1533.81 (2.06)	1654.29 (1.98)	1620.38 (1.79)	1565.05 (2.01)
7	**Total Working Capital**	**54603.18 (73.34)**	**58172.53(69.45)**	**55887.03 (61.67)**	**55400.81 (71.19)**
8	Interest on working Capital	1638.09 (2.20)	1745.17 (2.08)	1676.61 (1.85)	1662.01 (2.14)
9	Rental value of Land	10000 (13.43)	11059.89 (13.20)	11594.20 (12.79)	10358.14 (13.31)
10	Interest on Fixed Capital	1444.70 (1.94)	5166.45 (6.17)	13224.74 (14.59)	3320.53 (4.27)
11	Sub Total	67685.97 (90.91)	76144.04 (90.91)	82382.58 (90.91)	70741.51 (90.91)
12	Marginal Cost @10% of Sub Total	6768.59 (9.09)	7614.40 (9.09)	8238.25 (9.09)	7074.14 (9.09)
Grand Total		**74454.56**	**83758.44**	**90620.83**	**77815.66**

***Note** – Figures in parenthesis shows the per cent to corresponding grand total.*

Table-2: Measures of per hectare Cost and Return of hybrid paddy (Rs./ha.)

S. No.	Particulars	Average size of sample farms			Overall Average
		Marginal (< 1.0 ha)	Small (1.0–2.0 ha)	Medium (2.0– 4.0 ha)	
1.	**Cost A_1/A_2**	47914.01	55130.62	55227.31	49998.45
2.	**Cost B_1**	49358.71	60297.08	68452.05	53318.98
3.	**Cost B_2**	59358.71	71356.98	80046.25	63677.13
4.	**Cost C_1**	57685.98	65084.16	70788.38	60383.37
5.	**Cost C_2**	67685.98	76144.06	82382.58	70741.53
6.	**Cost C_3**	**74454.56**	**83758.44**	**90620.83**	**77815.66**
7.	**Productivity (qt./ ha)**				

a.	Main Product	52.58	55.12	55.34	53.33
b.	By Product	61.12	62.03	63.17	61.49
8.	Gross Income	142556.54	153065.73	154465.85	145717.94
a.	Main Product	115686.51	125136.73	126023.56	118492.13
b.	By Product	26870.03	27929.00	28442.29	27225.81
9.	Net Income	68101.98	69307.27	63845.02	67902.27
10.	Family labour Income	83197.83	81708.75	74419.60	82040.80
11.	Farm Business Income	94642.53	97935.11	99238.54	95719.48
12.	Farm Investment Income	86315.26	93148.03	96902.21	88655.09
13.	Cost of Production (Rs./qt.)	1149.12	1242.30	1336.01	1185.28

14.	**Benefit-Cost Ratio (BCR)**				
a.	Based on Cost A_1/ A_2	1:2.97	1: 2.77	1: 2.79	1:2.91
b.	Based on Cost B_1	1:2.88	1: 2.53	1: 2.25	1: 2.75
c.	Based on Cost B_2	1:2.40	1:2.14	1: 1.92	1: 2.30
d.	Based on Cost C_1	1:2.47	1:2.35	1: 2.18	1:2.41
e.	Based on Cost C_2	1:2.10	1:2.01	1: 1.87	1: 2.06
f.	Based on Cost C_3	1:1.91	1: 1.82	1:1.70	1: 1.87

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