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Cost and returns of organic paddy Cultivation in Bastar District of Chhattisgarh

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Abstract

Organic paddy cultivation is being actively promoted in the tribal, rainfed tracts of Bastar district, Chhattisgarh, yet detailed farm-level evidence on its cost structure and profitability across farm-size categories remains limited. This study examined the cost of cultivation, yield, income and profitability of organic paddy in Lohandiguda block of Bastar district, using primary data from 60 organic paddy growers (agricultural year 2025–26) selected through simple random sampling across marginal, small, medium and large farm-size categories, and analysed through standard CACP cost concepts (Cost A1 to Cost C3), gross income, net income, input–output ratio and benefit–cost ratio. The overall per-hectare cost of cultivation was ₹63,187.20, comprising ₹39,040.44 (61.8 per cent) variable cost and ₹24,146.75 (38.2 per cent) fixed cost, with manure and compost (₹8,319.88/ha) the single largest variable-cost item, followed by hired and family human labour, while biopesticide expenditure remained modest at ₹1,205.69/ha. Cost rose steadily with farm size, from ₹62,321.59/ha on marginal holdings to ₹63,918.81/ha on large holdings. Average yield was 40.42 q/ha, generating a gross income of ₹1,31,063.98/ha and a net income of ₹67,876.78/ha, with the input–output ratio (2.07 overall) and benefit–cost ratio (1.07 overall) both improving with farm size. The benefit–cost ratio fell below unity on marginal (0.95) and small (0.99) holdings, indicating that the smallest organic growers barely recovered their imputed cost. These results suggest that raising organic paddy's economic viability, particularly for marginal and small farmers, will depend on closing the yield gap and securing assured premium pricing, better market linkage and certification support. The study emphasized the need for a comprehensive strategy involving stakeholder participation, improved marketing infrastructure, financial support, and promotion of eco-friendly technologies to encourage wider adoption of organic farming.

Keywords: Organic paddy cultivation, cost of cultivation, profitability

Introduction

Organic farming relies on natural inputs – compost, green manures, bio-fertilizers and biological pest control – in place of synthetic chemicals, aiming to sustain soil fertility, environmental quality and human health over the long run. Rising input costs and growing concern over the sustainability of chemical-intensive cultivation have brought farm-level economic assessment of organic systems to the centre of policy and research attention (Pretty *et al.*, 2006) ^[8].

Globally, about 2–2.1 per cent of agricultural land (nearly 98–99 million hectares in 2023) is under organic management, with a growing share from Asia, where rice is an important organic crop. India alone accounts for around 4.5 million hectares and over two million organic producers, many of them growing paddy (NCOF, 2023) ^[5]. The organic rice segment is also expanding faster than the overall rice market – from about USD 2.25 billion in 2024 to around USD 3.57 billion by 2030 signalling robust demand growth.

India supports nearly 17 per cent of the world's population on about 2.4 per cent of its land and 4 per cent of its water resources, making rice, its principal staple, central to food security; India is the second-largest global producer, contributing roughly one-fourth of world output. Record production, driven largely by intensive chemical use, has raised concerns over soil health and rising costs, prompting policy support for organic and natural farming through schemes such as NPOF and PKVY.

Chhattisgarh, the “Rice Bowl of Central India,” grows paddy on about 3.6–3.8 million hectares, largely under rainfed, small and marginal farming, with agriculture supporting over 65 per cent

of the rural population. In tribal regions such as Bastar, historically low chemical-input use has favoured the expansion of organic cultivation, supported by active government promotion (Reddy & Rao, 2019; Singh *et al.*, 2020) ^[9, 10].

Few studies, however, have examined the cost of cultivation of organic paddy on a common per-hectare footing and across farm-size categories, within a single tribal district, using the full range of standard cost concepts – leaving a gap in the locally grounded evidence that policymakers need. This study therefore estimates, for organic paddy growers across marginal, small, medium and large farms in Bastar district, the cost of cultivation (Cost A1 to Cost C3), yield, gross and net income, and the input–output and benefit–cost ratios.

Materials and Methods

Study area

The study was conducted in Bastar district, in southern Chhattisgarh, a region of undulating topography, fertile land and a tropical monsoon climate favouring paddy. Lohandiguda block, about 20 km west of Jagdalpur, was purposively selected for its substantial paddy area and sizeable population of organic growers under comparable agro-climatic and socio-economic conditions, while Bastar itself was chosen for its tribal, low-input farming base and active government promotion of organic farming.

Research design, sampling and data collection

A descriptive and analytical design was adopted. Villages practising organic paddy cultivation were identified with the Department of Agriculture and local extension functionaries, and 60 organic paddy farmers were selected through simple random sampling and classified into marginal (below 1 ha), small (1–2 ha), medium (2–4 ha) and large (above 4 ha) farm-size categories. Primary data for 2025–26 were collected

through personal interviews using a pre-tested structured schedule covering socio-economic characteristics, input use, cost, yield, returns and marketing, while secondary data were drawn from the Directorate of Economics and Statistics, Department of Agriculture and Farmers Welfare (Chhattisgarh), IGKV, NABARD, APEDA and the Ministry of Agriculture and Farmers Welfare, Government of India.

Socio-demographic profile of respondents

The sample of organic growers was dominated by economically active, middle-aged, male farmers, with Scheduled Tribe households forming the largest social category, consistent with Bastar's tribal profile. Most respondents had only elementary education, annual farm incomes were concentrated in the ₹50,001–₹1,50,000 bracket, and marginal and small holdings together made up about two-thirds of the sample. Nuclear families outnumbered joint families.

Results and Discussion

Per-hectare cost of cultivation of organic paddy

Table 1 presents the item-wise per-hectare cost of organic paddy cultivation. Total cost rose from ₹62,321.59 on marginal farms to ₹63,918.81 on large farms, averaging ₹63,187.20/ha overall, a mild increase with farm size driven mainly by rising hired labour and machinery charges as family labour and bullock use declined. Manure and compost (₹8,319.88/ha) was the largest variable-cost item, exceeding 13 per cent of total cost, while biopesticides accounted for a comparatively modest ₹1,205.69/ha. Hired human labour rose sharply with farm size, from ₹4,685.62 on marginal to ₹10,896.84 on large farms, as family labour (₹9,856.41 to ₹4,584.19) was progressively substituted by hired workers. Within fixed cost, the rental value of owned land (₹21,480.85/ha) dominated, accounting for well over four-fifths of the fixed-cost total.

Table 1: Per-hectare cost of cultivation of organic paddy (₹/ha)

Particulars	Marginal	Small	Medium	Large	Overall
A. Variable cost					
Hired human labour	4,685.62	6,128.43	8,425.76	10,896.84	7,504.32
Family human labour (imputed)	9,856.41	7,746.33	6,845.28	4,584.19	7,338.56
Owned bullock labour	1,684.52	1,468.36	0.00	0.00	742.88
Owned machinery charges	1,088.46	1,886.25	3,345.62	5,584.37	2,936.90
Hired machinery charges	6,465.34	6,048.72	4,882.31	2,194.56	4,955.39
Manure and compost	8,184.28	8,386.52	8,344.38	8,389.46	8,319.88
Biopesticides	1,188.39	1,193.52	1,205.67	1,238.24	1,205.69
Seed cost	2,484.63	2,576.45	2,568.58	2,645.36	2,564.40
Miscellaneous expenses	1,026.84	1,164.38	1,288.56	1,394.82	1,216.96
Irrigation charges	704.38	726.45	786.82	792.15	753.92
Interest on working capital @4%	1,494.75	1,493.02	1,507.72	1,508.80	1,501.56
Total variable cost (A)	38,863.62	38,818.43	39,200.70	39,228.79	39,040.44
B. Fixed cost					
Land revenue	6.25	6.25	6.25	6.25	6.25
Depreciation on building & machinery @10%	928.54	1,096.38	1,123.44	1,187.62	1,079.96
Rental value of owned land	20,988.54	21,524.63	21,594.04	21,880.92	21,480.85
Interest on fixed capital @7%	1,534.63	1,583.91	1,590.66	1,615.24	1,579.69
Total fixed cost (B)	23,457.96	24,211.17	24,314.39	24,690.03	24,146.75
Total cost of cultivation (A+B)	62,321.59	63,029.59	63,515.09	63,918.81	63,187.20
Production (quintals)	37.50	38.71	41.87	43.46	40.42

Source: Primary data, 2026.

Cost concepts (Cost A1 to Cost C3)

Table 2 presents the build-up from Cost A1 to Cost C3 for organic paddy growers. Cost A1 equalled Cost A2 (₹31,701.89/ha overall), as no farmer had leased-in land. Adding interest on owned fixed capital (B1) and, more substantially, the

rental value of owned land (B2) sharply widened the cost base, while imputed family labour (C1, C2) had a proportionally larger effect on marginal and small farms, where family labour use was highest. Cost C3, incorporating a 10 per cent managerial allowance, reached ₹52,754.56/ha overall, falling steadily from

₹55,280.13/ha on marginal farms to ₹49,971.04/ha on large farms as the relative weight of imputed family-labour and

management costs declined with scale.

Table 2: Cost concepts of organic paddy cultivation (₹/ha)

Particulars	Marginal	Small	Medium	Large	Overall
Cost A1	29,007.21	31,072.10	32,355.42	34,644.60	31,701.89
Cost A2	29,007.21	31,072.10	32,355.42	34,644.60	31,701.89
Cost A2 + FL	38,863.62	38,818.43	39,200.70	39,228.79	39,040.44
Cost B1	30,541.85	32,656.00	33,946.08	36,259.83	33,281.58
Cost B2	51,530.39	54,180.63	55,540.12	58,140.75	54,762.43
Cost C1	40,398.26	40,402.33	40,791.36	40,844.02	40,620.14
Cost C2	50,254.67	48,148.66	47,636.64	45,428.21	47,958.69
Cost C3	55,280.13	52,963.53	52,400.30	49,971.04	52,754.56

Source: Primary data, 2026.

Yield and gross income

Table 3 presents yield and gross income of organic paddy. Main-product yield averaged 40.42 q/ha overall, rising from 37.50 q/ha on marginal farms to 43.46 q/ha on large farms, reflecting better resource use and management on bigger holdings. At an

average farm-gate price of about ₹3,100/q for the main product and ₹110/q for the by-product, gross income rose from ₹1,21,604.25/ha on marginal farms to ₹1,40,931.22/ha on large farms, averaging ₹1,31,063.98/ha overall.

Table 3: Per-hectare yield and gross income of organic paddy

Particulars	Marginal	Small	Medium	Large	Overall	Unit
Main product yield	37.50	38.71	41.87	43.46	40.42	q/ha
Value of main product	1,16,250.00	1,20,001.00	1,29,797.00	1,34,726.00	1,25,293.22	₹/ha
By-product yield	48.68	50.25	54.35	56.41	52.46	q/ha
Value of by-product @₹110/q	5,354.25	5,527.01	5,978.20	6,205.22	5,770.76	₹/ha
Gross income	1,21,604.25	1,25,528.01	1,35,775.20	1,40,931.22	1,31,063.98	₹/ha

Source: Primary data, 2026.

Net income, input–output ratio and benefit–cost ratio

Table 4 summarises the profitability of organic paddy cultivation. Overall net income averaged ₹67,876.78/ha, rising steadily from ₹59,282.66/ha on marginal farms to ₹77,012.40/ha on large farms. The input–output ratio improved from 1.95 on marginal farms to 2.20 on large farms (2.07 overall), and the benefit–cost ratio rose from 0.95 to 1.20 across the same range (1.07 overall). Organic cultivation recorded a benefit–cost ratio below unity on marginal (0.95) and small (0.99) farms, indicating that the smallest holdings barely covered their imputed cost, whereas medium and large operators achieved comfortably positive returns – evidence of economies of scale favouring bigger organic growers.

Table 4: Net income, input–output ratio and benefit–cost ratio of organic paddy cultivation

Particulars	Marginal	Small	Medium	Large	Overall
Net income	59,282.66	62,498.42	72,260.11	77,012.40	67,876.78
Input–output ratio	1.95	1.99	2.14	2.20	2.07
Benefit–cost ratio	0.95	0.99	1.14	1.20	1.07

Source: Primary data, 2026.

These results align with, and add local texture to, wider evidence on organic paddy economics. The comparatively low plant-protection (biopesticide) cost observed here echoes earlier comparisons (Kondaguri, 2012; Bhadu *et al.*, 2024) ^[3, 1], and the cost, yield and input–output ratios reported fall within ranges documented for the Bastar plateau and other parts of Chhattisgarh (Netam *et al.*, 2016, 2019; Lakra *et al.*, 2017) ^[6, 7, 4]. A distinctive feature of the present findings is the sensitivity of profitability to farm size: where other studies report a price premium for organic paddy – as in the Tungabhadra command area (Kondaguri, 2012) ^[3] and Punjab Basmati (Bhadu *et al.*, 2024) ^[1] – such a premium can lift returns on smaller holdings

above the break-even point; in its absence, as observed in Bastar, marginal and small organic growers remain vulnerable to sub-unity benefit–cost ratios.

Conclusion

This assessment of 60 organic paddy growers in Lohandiguda block, Bastar, shows an average per-hectare cost of cultivation of ₹63,187.20, dominated by manure/compost and labour expenditure, alongside comparatively low biopesticide cost. Average yield of 40.42 q/ha generated a gross income of ₹1,31,063.98/ha and a net income of ₹67,876.78/ha, with an overall input–output ratio of 2.07 and benefit–cost ratio of 1.07. Profitability rose consistently with farm size, and the benefit–cost ratio fell below unity on marginal and small holdings, indicating that these growers barely covered their imputed cost. Improving organic paddy's viability in Bastar, especially for marginal and small farmers, therefore hinges on closing the yield gap and securing assured premium prices, stronger market linkage and certification support.

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