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Cost economic analysis of wheat cultivation in Kanpur Nagar district of Uttar Pradesh

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Abstract

The present study was conducted to examine the economics of wheat cultivation in Kanpur Nagar district of Uttar Pradesh during the agricultural year 2025–2026. A purposive-cum-multistage random sampling technique was employed for the selection of respondents, and a total of 100 wheat growers were selected from Kalyanpur block. The selected respondents were categorised into marginal, small, and medium farm groups. Primary data were collected through personal interviews using a pre-structured and carefully designed schedule, while secondary data were obtained from official records, journals, books, and published reports. The study analysed the cost structure, profitability, returns, and input-output relationship in wheat cultivation by applying standard cost concepts such as Cost A1, B1, B2, C1, C2, and C3. The findings revealed that the overall average total cultivation cost (Cost C3) was estimated at ₹48,792.95 per hectare, whereas the average gross income was recorded at ₹1,04,066.64 per hectare. Human labour, machinery charges, irrigation, and fertilisers constituted the major components of cultivation cost. Medium farms incurred comparatively higher production costs but achieved greater productivity and profitability than marginal and small farms. The average yield of wheat was estimated at 43.36 quintals per hectare, while the average net return over Cost C3 was found to be ₹55,273.69 per hectare. The overall benefit-cost ratio was estimated at 1.13, indicating that wheat cultivation was economically viable and profitable in the study area. The findings highlighted the importance of efficient resource utilisation and improved farm management practices in enhancing wheat productivity and farm income.

Keywords: Wheat cultivation, cost of production, profitability, benefit-cost ratio, farm income

Introduction

Wheat was regarded as one of the most important cereal crops in the world due to its vital contribution to food security, nutrition, and agricultural development. It was cultivated extensively across temperate and subtropical regions because of its adaptability to diverse climatic and soil conditions. In India, wheat occupied a prominent position among food grains and served as a staple diet for a large proportion of the population. The crop played a crucial role in strengthening the national economy by contributing significantly to agricultural production, rural employment, and farmers' income. The introduction of high-yielding varieties, improved irrigation facilities, and modern agricultural technologies during the Green Revolution greatly enhanced wheat productivity and transformed India into one of the leading wheat-producing countries globally. Wheat cultivation was characterised by intensive use of inputs such as quality seed, fertilisers, irrigation, and machinery, which substantially influenced production efficiency and profitability. In addition, wheat and its by-products were widely utilised in flour mills, bakery industries, animal feed preparation, and other agro-based enterprises. Despite its economic and nutritional importance, wheat cultivation was constrained by rising input costs, climate variability, pest infestations, and fluctuations in market prices. Therefore, the study of wheat production and profitability was considered essential for

ensuring sustainable agricultural growth and improving farmers' livelihoods.

Research Methodology

The study employed a purposive-cum-multistage random sampling technique for the selection of respondents from Kanpur Nagar district in order to obtain a representative and diversified sample of wheat growers. Initially, Kanpur Nagar district was purposively selected as the study area to minimise logistical difficulties and reduce time constraints for the researcher. Among the various blocks of the district, Kalyanpur block was chosen due to its significant involvement in wheat cultivation, which made it suitable for the present investigation. A comprehensive list of villages within Kalyanpur block was prepared, from which five per cent of the villages with considerable wheat cultivation potential were randomly selected. Subsequently, ten per cent of the total wheat farming households from the selected villages were randomly chosen, resulting in a final sample of 100 farmers. The selected respondents were further categorised into three landholding groups, namely marginal (below 1 hectare), small (1–2 hectares), and medium (4–10 hectares). Primary data were collected through direct personal interviews with the respondents using a carefully structured and pre-designed interview schedule. In addition, secondary data were obtained from official reports, published books, research journals, and records maintained

at the district and block headquarters. The process of data collection was undertaken during the agricultural year 2025–2026, and the collected information was analysed using suitable statistical techniques in order to derive meaningful findings and conclusions from the study.

Analytical Tools

Cost of Wheat Production

Cost - A1

- Value of hired human labour
- Value of hired bullock labour
- Value of owned bullock labour
- Value of owned machinery labour
- Hired machinery charges
- Value of seed (purchased)
- Value of insecticide and pesticide
- Value of manures (owned and purchased)
- Value of fertilizer
- Depreciation on implements and farm buildings
- Irrigation charge
- Land revenue, cases and other taxes
- Interest on working capital

- Miscellaneous expenses (artisans etc.)

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

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

Cost B2: Cost B1 + rental value of owned land (net of land revenue) and rent paid for leased –in land.

Cost C1: cost B1 + imputed value of family labour.

Cost C2: cost + imputed value of family labour

Cost C2*: Cost C2 adjusted to take into account valuation of human labour at market rate or statutory minimum wage rete whichever is higher

Cost C3: Cost C2* + value of management input at 10%of total cost (C2*) Cost C is the total cost of cultivation.

- Farm business income = Gross income – Cost A1 or A2
- Family labour income = Gross income – Cost B
- Net income = Gross income – Cost C
- Farm investment income = Farm business income – Imputed value of family labour.
- Benefit: Cost ratio = . Gross income/Total Cost

Results and Discussion

Table 1: Per hectare costs of different inputs used in Wheat production (Rs.)

S. No.	Particulars	Size group of farms			
		Marginal (50)	Small (37)	Medium (13)	Overall average
1	Human Labour	9636.34 (20.51)	10593.24 (21.22)	11123.41 (21.19)	10183.71 (20.87)
a.	Family Labour	5985.78 (12.74)	3746.42 (7.50)	1984.46 (3.78)	4637.05 (9.50)
b.	Hired Labour	3650.56 (7.77)	6846.82 (13.71)	9138.95 (17.41)	5546.67 (11.37)
2	Machinery Charges	5345.28 (11.37)	5743.95 (11.50)	6196.88 (11.80)	5603.50 (11.48)
3	Seed	3246.32 (6.91)	3384.48 (6.78)	3492.55 (6.65)	3329.45 (6.82)
4	Manure and fertilizer	4816.31 (10.25)	5124.39 (10.26)	5817.83 (11.08)	5060.50 (10.37)
5	Irrigation	4842.98 (10.31)	5218.23 (10.45)	5434.29 (10.35)	5058.69 (10.37)
6	Plant Protection/Intercultural	2366.36 (5.04)	2617.78 (5.24)	2836.34 (5.40)	2520.48 (5.17)
7	Total working capital	30253.59 (64.38)	32682.07 (65.46)	34901.3 (66.48)	31756.33 (65.08)
8	Interest on working capital	1210.1436 (2.58)	1307.28 (2.62)	1396.052 (2.66)	1270.25 (2.60)
9	Rental value of land	10000 (21.28)	10000.00 (20.03)	10000 (19.05)	10000.00 (20.49)
10	Interest on fixed capital	1256 (2.67)	1398.00 (2.80)	1426 (2.72)	1330.64 (2.73)
11	Sub total	42720 (90.91)	45387.35 (90.91)	47723 (90.91)	44357.22 (90.91)
12	Managerial Cost@10% of sub-total	4272 (9.09)	4538.74 (9.09)	4772 (9.09)	4435.72 (9.09)
	Grand total	46991.71 (100.00)	49926.09 (100.00)	52495.69 (100.00)	48792.95 (100.00)

Table 1: The table presented the per hectare cost structure of wheat cultivation across different farm size groups. The findings revealed that the overall average total cost of wheat cultivation was estimated at ₹48,792.95 per hectare. Among the various cost components, total working capital constituted the highest share, accounting for 65.08 per cent of the total cost, followed by rental value of land (20.49 per cent) and managerial cost (9.09 per cent). Human labour emerged as a major component of cultivation expenditure, contributing 20.87 per cent to the total cost. Within human labour, hired labour accounted for a larger proportion than family labour on medium and small farms, whereas marginal farms relied more heavily on family labour.

Machinery charges also formed a significant share of the total expenditure, indicating the increasing mechanisation of wheat cultivation in the study area. Expenditure on seed, manure and fertilisers, irrigation, and plant protection measures collectively represented an important portion of production costs, reflecting the intensive input use required for wheat cultivation. Medium farms incurred the highest overall cultivation cost per hectare, followed by small and marginal farms. The results suggested that wheat cultivation was input intensive and required considerable investment in labour, machinery, fertilisers, irrigation, and land resources to achieve higher productivity and efficient farm management.

Table 2: Measures of per - hectare coat and profits of Wheat (Rs.)

S. No.	Particulars	Size group of farms			
		Marginal (50)	Small (37)	Medium (13)	Overall average
1	Cost A ₁ /A ₂	25477.95	30242.93	34312.89	28389.54
2	Cost B ₁	26733.95	31640.93	35738.89	29720.18
3	Cost B ₂	36733.95	41640.93	45738.89	39720.18
4	Cost C ₁	32719.73	35387.35	37723.35	34357.22
5	Cost C ₂	42719.73	45387.35	47723.35	44357.22
6	Cost C ₃	46991.71	49926.09	52495.69	48792.95
7	Yield l/ha.	39.52	45.65	51.62	43.36
8	Gross Income	94848	109560	123888	104066.64
9	Net return over cost C ₃	47856.29	59633.91	71392.31	55273.69
10	Family Labour Income	58114.05	67919.07	78149.11	64346.46
11	Farm Business Income	69370.05	79317.07	89575.11	75677.10
12	Farm Investment Income	63384.27	75570.65	87590.65	71040.06
13	Cost of production (q/ha.)	1189.06	1093.67	1016.96	1131.39
14	Benefit Cost Ratio	1.02	1.19	1.36	1.13
15	Input- output ratio				
a	on the basis of Cost A ₁	3.72	3.62	3.61	3.67
b	On the basis of cost B ₁	3.55	3.46	3.47	3.51
c	On the basis of Cost B ₂	2.58	2.63	2.71	2.62
d	On the basis of Cost C ₁	2.90	3.10	3.28	3.02
e	On the basis of Cost C ₂	2.22	2.41	2.60	2.34
f	On the basis of Cost C ₃	2.02	2.19	2.36	2.13

Table 2: The table presented the per hectare cost and profitability measures of wheat cultivation across different farm size groups. The findings indicated that the overall average Cost C₃ of wheat cultivation was estimated at ₹48,792.95 per hectare, while the average gross income was recorded at ₹1,04,066.64 per hectare. Medium farms incurred the highest cultivation cost as well as generated the highest gross income compared to marginal and small farms. The average wheat yield was observed to be 43.36 quintals per hectare, with medium farms attaining the highest productivity level of 51.62 quintals per hectare. The average net return over Cost C₃ was estimated at ₹55,273.69 per hectare, demonstrating that wheat cultivation was economically profitable in the study area. Family labour income, farm business income, and farm investment income were also found to increase with farm size, reflecting better managerial efficiency and resource utilisation on medium farms. The average cost of production was calculated at ₹1,131.39 per quintal, whereas medium farms recorded the lowest cost of production, indicating the existence of economies of scale in wheat cultivation. The overall benefit-cost ratio was estimated at 1.13, implying that every rupee invested in wheat cultivation generated ₹1.13 as returns. Furthermore, the input-output ratios under different cost concepts confirmed the economic viability and profitability of wheat production across all categories of farms.

Conclusion

The study concluded that wheat cultivation played a significant role in strengthening agricultural income and ensuring livelihood security among farmers in the study area. The analysis of cost and return structure revealed that wheat cultivation was an input-intensive enterprise requiring considerable expenditure on human labour, machinery, irrigation, seed, fertilisers, and other production inputs. Among the various cost components, total working capital, rental value of land, and human labour constituted the major share of total cultivation cost. The findings further indicated

that medium farms incurred comparatively higher cultivation costs; however, they achieved greater productivity, higher gross income, and superior profitability due to efficient utilisation of resources and economies of scale. The overall average yield of wheat was estimated at 43.36 quintals per hectare, while the average gross income and net return over Cost C₃ were recorded at ₹1,04,066.64 and ₹55,273.69 per hectare, respectively. The benefit-cost ratio of 1.13 demonstrated that wheat cultivation remained economically viable and remunerative across all farm categories. The study also observed that family labour income, farm business income, and farm investment income increased with farm size, indicating better managerial efficiency among medium farmers. Furthermore, the lower cost of production recorded on medium farms reflected improved operational efficiency and adoption of modern cultivation practices. Despite the profitability of wheat cultivation, farmers continued to face challenges such as rising input prices, irrigation dependency, climatic uncertainties, and fluctuations in market returns. Therefore, the study emphasised the need for policy interventions aimed at ensuring timely availability of quality inputs, strengthening irrigation infrastructure, promoting modern agricultural technologies, and providing remunerative prices for wheat produce. Such measures were considered essential for enhancing the sustainability, productivity, and profitability of wheat cultivation, particularly among marginal and small farmers.

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