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Cost and return of wheat crop in Hamirpur district, Uttar Pradesh (India)

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Abstract
Wheat has emerged as the backbone of India food security as it contributed 35.05 per cent of total food grain production of the country (FAO, 2023). The world would require around 840 million tonnes of wheat by 2050 from current production level of 642 million tonnes. The study was conducted in the Hamirpur district of Uttar Pradesh The multistage, stratified random sampling method was used for the selection of district, blocks, villages, and respondents, which was district, block, purposely and village and respondent selected was randomly. This district comprises 7 block, among which the Rath, Sarila and Gohand three block purposely selected. The respondent was selected 180. It was observed That cultivation increase with the farm size, with the highest production cost for large farms amounting to Rs. 62441.04 per hectare. The largest expense in wheat cultivation was attributed to human labour, which accounted for Rs. 12966.63 per hectare, while the overall cost of cultivation average Rs. 58586.29 per hectare. On average, the gross income was recorded at Rs. 106059.64. The input output ratio for wheat crop was calculated as 1:1.81 ultimately, wheat cultivation was determined to be profitable, with potential for increased per unit of time and area, provided that production and marketing constraints are addressed.

Keywords: Cost of cultivation, wheat crop, Gross return, CACP, input-output ratio

Introduction
Wheat (*Triticum aestivum* L.) belongs to family Graminae (formally Poaceae) and genus *Triticum.* Wheat has emerged as the backbone of India food security as it contributed 35.05 per cent of total food grain production of the country (FAO, 2023). In India, *Triticum aestivum* (Chapati wheat) is grown on about 90-95% of area, *Triticum durum* is cultivated on 5% area of central and southern India, and the remaining one per cent is grown on the other. The world would require around 840 million tonnes of wheat by 2050 from current production level of 642 million tonnes. The fast unravelling sequence information under various national and international projects might offer newer opportunities for reinventing wheat as a crop for ensuring food and nutritional security across the globe (Sharma, 2015) [10]. Wheat is the leading cereal grain production, consumed and trade in the world today. The total production area of the world in 2024 is 220 million hectare with a production of 791.21 million tonnes. A slightly increase in both wheat production and total harvested area from 789.89 million tonnes in 2023 to 791.21 million tonnes in 2024 and 220 million hectares in 2024 to 208 million hectares in 2023, respectively (STATA, 2024). The Stata data reveals that approximately 791.21 million tonnes of wheat were produced globally in 2023-24, with China (23.587 million hectares, 140.99 million tonnes and 59.4 qt/hectare), European Union ((22.83 million hectares, 121 million tonnes and 53.1 qt/hectare) India (31.83 million hectares, 113.29 million tonnes and 35.6 qt/hectare), Russia (28.00 million hectares, 81.500 million tonnes and 29.1 qt/hectare), United State (15.56 million hectares, 53.65 million tonnes and 34.5 qt/hectare *etc.* Above figures indicate the total harvested area of India (31.83 million hectares) greater the China (23.58 million hectares) and total production (140.99 million tonnes, 113.29 million tonnes) and productivity (59.4 qt/ha., 35.6 qt/ha. less than China. During the fiscal year 2023-24, wheat produced across India accounted for over 113.29 million tonnes, which was increase of over 2.74 million tonnes from the previous fiscal year as 110.55 million tonnes, wheat harvested area increased 31.83 million hectare

(2023) compare to 110.55 million hectare previous year and the total productivity also increased 35.21qt/ha to 35.59 (Source: agricultural statistical at a glance). Department of agriculture and farmers welfare data reveals Uttar Pradesh (9.52 million hectares, 30.31 million tonnes and Productivity 35.31 qt/ha), Madhya Pradesh (7.15 million hectares, 22.73 million tonnes and Productivity 31.79 qt/ha), Punjab (3.53 million hectares, 16.78 million tonnes and Productivity 47.48 qt/ha), Haryana (2.32 million hectares, 10.93 million tonnes and Productivity 47.04 qt/ha) and Rajasthan (2.79 million hectares, 10.63 million tonnes and Productivity 38.07 qt/ha). Above data reveals Uttar Pradesh is highest percentage share in area (30.31%) and Production (30.40%), while in Productivity Punjab and Haryana is leading with approximately 47qt/ha (Source: agricultural statistical at a glance-2022).

In 2021-22 Hamirpur district of Uttar Pradesh had total wheat area, production and productivity approximately 117657 hectares, 3542650 quntal and 32.11 qt/ha, respectively while 2022-23 in area, production and productivity was 143552 hectares, 461807 tonnes and 32.2 qt/ha respectively (Sources: DES Lucknow-2023).

In India, the yearly per capita wheat consumption will increase to 74 kg in 2030 and 94 kg in 2050 from 60.4 kg in 2019 (Mottaleb, 2023) [7]. The Bundelkhand region of Uttar Pradesh received its first Geographical Indication (GI) tag for Kathiya Gehu on April 1, 2024. Hamirpur district was higher productivity compare to other district of Bundelkhand region previous year (sources: District Statistical magazine 2023). Hard wheat from the Great Plains historically has been used as a source of flour for the production of leavened bakery products (Graybosch, 2009) [5]. The cost of cultivation is an important economic indicator being takes into consideration by the Govt. of India while fixing minimum support prices for various agricultural crops. But wide variation has been noticed in the cost of cultivation of the crop. It varies from region to region and even from farmer to farmer of a given region. The study of cost and return provides the idea of profitability and could be a yardstick to planners and policy maker. The average overall cost of cultivation of wheat production was Rs. 53291.16, varying from Rs. 49900.00 to Rs. 56542.27 per hectare on different size group of farms (Singh, 2020) [8].

Research Methodology

The study was conducted in the Hamirpur district of Uttar Pradesh The multistage, stratified random sampling method was used for the selection of district, blocks, villages, and respondents, which was district, block, purposely and village and respondent selected was randomly. This district comprises 7 block, among which the Rath, Sarila and Gohand three block purposely selected. This study was conducted in Hamirpur district of Uttar Pradesh during 2023-24. The district consists of 4 tehsils and 7 blocks. Three block i.e. Rath, Gohand and Sarila were purposely selected for the studies. Total six village selected, two village from each block were selected randomly for the study. In all 30 marginal, small, medium and large farmers (respondent) were selected randomly from each village constituting the sample 180 respondents for the purpose of study. Data were collected with the help of personal interview method during the study period. The data were analyzed, tabulated and the result was drawn with the help of appropriate statistical methods.

Weighted Mean

$$W.A = \frac{W1X1+W2X2+\cdots WnXn}{W1+W2+W3\ldots Wn}$$

Where,
W.A. =Weighted average
X_i = variable
W_i = weights of X_i

Cost of production

It is the ratio of total cost incurred on wheat production and physical output obtained on sample farms.

$$\text{Cost of production (Rs./qtl.)} = \frac{\text{total cost} - \text{value of by product}}{\text{main product}}$$

Gross income: Total value of main product and total value of by-product.
Net farm income: Gross income–Total cost.
Farm investment income: Net farm income + interest on fixed capital + rental value of owned land.
Family labour income: Gross income –costB_2.
Farm business income: Grossincome–costA_1or costA_2.
B: C ratio B:C ratio= Net return /Cost C3or total cost

Result and Discussion

Cost and return

The cost and return have been summarized in this part on the sample farms. Beside the estimate of total costs, on the basis of six cost concept i.e. CostA1/A2, cost B1, cost B2, cost C1, cost C2 and cost C3 have been worked out for estimation of cost. Similarly, the various measures of farm profits, such as net income, gross income, cost of production, and input- output ratio for wheat crop have also been worked out.

1. Economics of wheat production

The cost and returns analysis of wheat crop were described with the help diverse variable i.e. human labour, family labour, machine labour, seed cost,plant protection, fertilizers and manures and fertilizers, interest on working capital, land rental value, taxes, depreciation and interest on fix capital was sown in the table- 2.1 per hectare.

The economics of wheat cultivation was studied and presented in Table- 1 per hectare costs incurred on the specific input factor in wheat production were worked out are given in Table-1 The highest cost of cultivation was reported on large farmers size of farms Rs. 62441.04 followed by Rs. 59844.66 Medium farms and Rs. 58886.8 on Small farms and Rs. 57417.36 on marginal farms.

Overall average of cost of cultivation was found to be Rs. 58586.29 on sample farms.

As far as the cost of different input component in concern on an overall average in was maximum on human labour (22.13 per cent) followed by Machinery labour (18.23 per cent), rental value (15.36 per cent), irrigation charge (11.79 per cent), manure and fertilizers (8.10 per cent), seed (4.09 per cent), plant protection (0.99 per cent), total operational cost (65.35 per cent) respectively of the total cost of cultivation. The cost of wheat cultivation reflects a positive negative relationship with size of group of farms as has been

increasing to increased in holding of size of sample farmers. The finding of cost of cultivation came to majority of resources in wheat cultivation turns out to be increase the category of farm with increases the input cost for the reason that since the low adoption of technology in the study area.

Table 1: Cost of cultivation of wheat crop (Rs. / ha)

S. No.	Particulars	Type of Farmers									
		Marginal	%	Small	%	Medium	%	Large	%	Average	%
(A)	Operational cost										
1	Human Labour	12501.17	21.77	12725.51	22.07	14629.2	24.44	13719.43	21.97	12966.63	22.13
a.	Family labour	8735.2	15.21	3421.49	7.22	2045.2	3.41	1218.87	1.95	5797.25	9.89
b.	Hired labour	3765.97	6.56	9304.02	16.85	12584	21.02	12500.56	20.01	7169.38	12.23
2	Machine labour	10943.08	19.05	10058.29	16.44	10413	17.40	11263.24	18.03	10683.41	18.23
3	Manure& Fertilizer	5293.01	9.21	4918.82	8.04	2940	4.91	3932.23	6.29	4746.22	8.10
4	Seed	2418.2	4.21	2450.5	4.01	2318.3	3.87	2252.4	3.60	2396.56	4.09
5	Irrigation	6900	12.02	6950	11.36	6800	11.36	7050	11.29	6912.50	11.79
6	Plant protection	549.399	0.95	757.50	1.24	523.364	0.87	423.15	0.67	584.73	0.99
	Total operational cost(1-6)	38604.86	67.24	37860.62	65.17	37623.86	62.86	38640.45	61.88	38290.05	65.35
7	Over head cost										
A.	Interest on working capital@ 7%	2632.34	4.58	2650.2	4.45	2634.83	4.40	2704.84	4.33	2643.90	4.51
B	Rental value of land(Balkat)	9000	15.67	9000	14.71	9000	15.03	9000	14.41	9000	15.36
C	Depreciation	1010.89	1.76	3073.18	5.02	4196.01	7.01	5495.01	8.80	2380.88	4.06
D	Interest on fix capital @10	949.51	1.65	942.54	1.55	949.53	1.58	924.28	1.48	945.43	1.62
	Sub Total	52197.6	90.91	53603.5	90.90	54404.23	90.90	56764.58	90.91	53260.26	90.91
	Managerial cost 10% CACP	5219.75	9.09	5360.35	9.09	5440.42	9.09	5676.45	9.09	5326.03	9.09
	Grand Total	57417.36	100	58886.8	100	59844.66	100	62441.04	100	58586.29	100

Sources: - data collected by researcher

2. Computation of cost and returns based on CACP for wheat production on sample farm

The cost and return have been summarized for sample farms in Table- 2.2. It is reveals from the table that, on an average cost A_1/A_2, B_1, B_2, C_1, C_2 and C_3 came to Rs. 37517.58, Rs. 38464.69, Rs. 47464.69, Rs. 44261.94, Rs. 53260.26 and 58586.29 respectively. On an average gross income was recorded Rs. 106059.64 and net income came to Rs. 47473.35. On large farms, gross income was highest, which was recorded Rs. 113639.5 followed by medium farms Rs. 109420.3, Small Farms Rs. 106583 and lowest marginal farms i. e. 103103.25 respectively. The net income was highest on large farms Rs. 51198.47 followed by medium farms Rs. 49575.65, small farms Rs. 47696.11 and marginal farms Rs. 45685.89. It show increasing trends of net income over cost C_3 to gross income. On an overall average family labour income, Farm investment income and farm business income were observed to Rs. 58594.95, 57418.77 and 68542.06 respectively. Family labour income was highest on marginal farms (59640.85) followed by large Rs. 58093.79, medium farm Rs. 57061.27 and small 56481.95 respectively. This shows indefinite trend association with farm size, and the farm business income indefinite relation with size of farms. On an overall average benefit cost ratio was found 1:1.81 and highest on medium size farms (1:1.82) as compared to small farm size (1:1.81), marginal farms size(1:1.79) and large farms size(1:1.82). It shows similar trend to gross income of different size of sample farms. In cost of Production cost of production on overall average farm Rs. 977.28 and highest on large farm Rs. 1011.27 followed by medium farm on Rs. 997.54, marginal farm on Rs. 979.79 and lowest cost of production on small farm size on Rs. 974.73 Respectively. In case of wheat cultivation Cost A_1 equal to cost A_1 because farmers had not taking leased in land for wheat cultivation in the study area.

Table 2: Cost and return of wheat crop (Rs./ha)

S. No.	Particulars	Marginal	Small	Medium	Large	Average
1	Cost A1/A_2	33512.89	40162.5	42409.5	45621.43	37517.58
2	Cost B_1	34462.4	41105.05	43359.03	46545.71	38464.69
3	Cost B_2	43462.4	50101.05	52359.03	55545.71	47464.69
4	Cost C_1	43197.2	44526.54	45404.23	47764.58	44261.94
5	Cost C_2	52197.60	54526.54	54404.23	56764.58	53260.26
6	Cost C_3	57417.36	58886.89	59844.65	62441.03	58586.29
7	Yield Main product (Qt/Ha.)	32.29	33.56	34.73	36.14	33.30
8	Yield By- product (qt/ha.)	62	62	63	65	63.25
9	Rate of main product	2425	2425	2425	2425	2425
10	Rate of by- product	400	400	400	400	400
11	Value of main product	78303.25	81383	84220.25	87639.5	80759.64
12	Value of by product	24800	25200	25200	26000	25300
13	Gross Income /return (main+ By- product)	103103.25	106583	109420.3	113639.5	106059.64
14	Family labour income	59640.85	56481.95	57061.27	58093.79	58594.95
15	Farm investment income	55635.4	57638.65	59525.18	61122.75	57418.77
16	Farm business income	69590.36	66420.5	67010.8	68018.07	68542.06
17	Net Income	45685.89	47696.11	49575.65	51198.47	47473.35
18	Cost of Production	979.79	974.73	997.54	1011.27	977.28

19	Input-output ratio					
a.	On the basis of cost A1	1:3.07	1:2.65	1:2.58	1:2.49	1:2.83
b.	On the basis of cost B1	1:2.99	1:2.59	1:2.52	1:2.44	1:2.75
c.	On the basis of cost B2	1:2.37	1:2.13	1:2.08	1:2.04	1:2.23
d.	On the basis of cost C1	1:2.38	1:2.39	1:2.40	1:2.37	1:2.39
e.	On the basis of cost C2	1:1.97	1:1.95	1:2.01	1:2.00	1:1.99
f.	On the basis of cost C3/ input-output ratio	1:1.79	1:1.81	1:1.82	1:1.82	1:1.81

Sources: - data collected by researcher

Conclusion

Wheat cultivation offer sustainable return to its moderate production cost. The average cost of cultivation per hectare was Rs. 58586.29 of all average type of farmer. The highest cost of cultivation was reported on large farmers size of farms Rs. 62441.04 followed by Rs. 59844.66 Medium farms and Rs. 58886.8 on Small farms and Rs. 57417.36 on marginal farms. The lower cost was on marginal farmers as compare to other all type farmers. The net return were highest on the large farmers Rs. 51198.47, followed by medium, small and marginal farms Rs. 49575.65, 47696.11 and 45685.89 respectively. The input output ration of cultivation of wheat crop in per hectare under average farms was 1:1.81.

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