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A study on cost of cultivation and profitability analysis of wheat production in Indore Block of Madhya Pradesh

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Abstract

The study was conducted in the Indore block of Indore district Madhya Pradesh to analyze cost of cultivation and profitability of wheat production in the Indore block. Simple random technique was used to acquire 75 wheat growing farmers. Cost of cultivation was calculated by applying different cost concept and profitability was analyzed with help of B:C ratio. Average total cost of cultivation of wheat production found to be ₹55980.05 /ha. which was highest on large farm (₹ 58125.09) followed by medium (₹57568.43), semi medium (₹55923.49), small (₹54789.85) and on marginal farm (₹53493.41/ha). The highest cost at large farm incurred due to large group of farmers invest more money on variable resources. Cost A₁ share maximum ₹31685.75/ha (56.60 per cent of cost C₃) in the total cost of cultivation and remaining (34.31 per cent) cost together share by Interest on fixed capital (3.97), rental value of own land (25.90 per cent), the imputed value of family labour (4.44 per cent). The average B: C ratio of wheat cultivation in the Indore block was observed 1: 1.73 which inferred wheat production is profitable in the study area.

Keywords: Wheat production, cost of cultivation, profitability analysis, B:C ratio, farm size

1. Introduction

Wheat (*Triticum aestivum* L.) is one of the most important cereal crops of the world and is grown in the largest area. It belongs to Gramineae family. Wheat is originated from South West Asia. Wheat is the most widely cultivated food crop in India and is the second most important staple food for more than half of the world's population. It has high nutritive value and can be used in many ways such as chapatti, poories, upma, baked leavened bread, flakes, cakes, biscuits, dalia and halwa. Wheat contains protein 8-15%, carbohydrates 60-70%, oil and fat 1.5%, fiber 2-2.5%. (FAO). The global area of wheat is about 220 million hectares with a total production of 819.10 million tonnes and an average productivity of 3.72 tonnes per hectare. In the world China rank first in the wheat-producing country during 2025–26 (Singh *et al*, 2023) [3] with a production of 140.07 million tonnes from 23.58 million hectares and a productivity of 5.94 tonnes per hectare. India ranked second, producing 120.21 million tonnes from the largest wheat area of 33.40 million hectares, with a productivity of 3.60 tonnes per hectare. (Food and Agriculture Organization of the United Nations FAOSTAT, 2025). In Madhya Pradesh wheat is grown on area of 101.09 lakh hectare with a production and productivity of 382.32 lakh metric tons and 3782 kg/ha, respectively (2024-25). In the Indore district wheat is an important cereal crop and occupies an area under cultivation 2.15 lakh hectare with production of 9.59 lakh metric tonnes and productivity 4456 Kg/ha respectively (Dept. of Agri. & Farmer Welfare Madhya Pradesh 2024-25).

2. Research methodology

The study was confined to Indore district of Madhya Pradesh. Indore district was selected purposively because this district has first position in area and production under wheat crop in the Malwa plateau, and also for the convenience of the researcher to get more accurate information. The multistage random sampling was used to acquire sample farmers for the study. Indore district has four blocks namely Depalpur, Indore, Mhow and Sanwer. At the first stage of sampling, Indore block were selected purposively, At the second stage of sampling, a list of wheat growing villages were prepared from Indore block then 5 villages were selected randomly then a list of wheat

growing farmers from each selected village was prepared then classified into five major categories on the basis of their land holding i.e. marginal (less than 1ha), small (1-2 ha), semi medium (2-4 ha), medium (4-10 ha) and large (10 ha or above). Then a sample of 75 farmers were selected from each block by simple random sampling technique. Thus, in all 75 sample farmers were selected.

2.1 Cost concepts

The cost and returns concepts were used to estimate total cost incurred on wheat production. Detail estimation procedure is given below. (Verma *et al*, 2016 and Kumar *et al*, 2023) ^[4, 5].

Cost A₁ = All actual expenses incurred in the crop production.

1. Value of hired human labour
2. Value of owned bullock labour
3. Value of hired bullock labour
4. Value of owned machine labour
5. Value of hired machine labour
6. Value of seed /seedling (farm produced or purchased)
7. Value of manures and fertilizers
8. Value of plant protection charges
9. Irrigation charges
10. Land revenue and taxes
11. Depreciation on farm building and implements
12. Interest on working capital

Cost A₂ = Cost A₁ + rent paid for leased in land

Cost B₁ = Cost A₁ + interest on value of owned capital asset (Excluding land)

Cost B₂ = Cost B₁ + rental value of owned land and rent paid for leased in land

Cost C₁ = Cost B₁ + imputed value of family labour

Cost C₂ = Cost B₂ + imputed value of family labour

Cost C₃ = Cost C₂ + 10% of cost C₂ as managerial cost

$$\text{Cost of production} = \frac{\text{Total Cost} - \text{Value of by Product ₹/ha}}{\text{Main product(qlt/ha)}}$$

2.2 Income measure

Different income measures are derived using the cost concepts. These measures used in the benefit analysis of the present study are shown below

1. Farm business income = Gross income - Cost A₁
2. Farm investment income = Farm business income – imputed value of family labour
3. Net income = Gross income - Total cost (Cost C₃)
4. Family labour income = Gross income - Cost B₂
5. B: C Ratio = $\frac{\text{Gross income(₹/ha)}}{\text{Total Cost (₹/ha)}}$

3. Results and Discussion

The cost of cultivation of wheat crop in the Indore Block was analyzed and the results are present in the table1. The result reveals that the average total cost of cultivation of wheat production found to be ₹55980.05 /ha. which was highest on large

farm (₹58125.09) followed by medium (₹57568.43), semi medium (₹55923.49), small (₹54789.85) and on marginal farm (₹53493.41/ha) Kumar *et al* 2025 ^[6]. The highest cost at large farm incurred due to large group of farmers invest more money on variable resources.

Cost A₁ share maximum ₹31685.75/ha (56.60 per cent of cost C₃) in the total cost of cultivation and remaining cost together share by Interest on fixed capital (3.97), rental value of own land (25.90 per cent), the imputed value of family labour (4.44 per cent). Cost A₁ among the categories were seen maximum on the large farm (₹33560.66/ha) followed by medium (₹33045.18/ha), semi-medium (₹31641.05/ha), small (₹30662.76/ha) and marginal farm (₹29519.11/ha). The expenditure trends among the categories indicated that cost A₁ increase with increase the size of farms. On an average, among the component of cost A₁ maximum cost share by machinery labour ₹5671.52 /ha (10.13 per cent of cost C₃) which was found to be highest under large farms (₹6547.85/ha) followed by medium (₹6247.71), semi-medium (₹5621.83ha), small (₹5121.39 /ha) and marginal (₹4818.84/ha). It implied that cost of machinery labour increase with increasing size of farms due to large and medium group of farmers utilize more of machinery labour as compared to marginal and small group. After the cost of machinery labour, cost on seed was second most expensive inputs, at overall level expenditure on seeds was observed ₹5536.55/ha (9.89 per cent of cost C₃) which was the highest on large size farm (₹5970.11/ha) and lowest on the small size of the farm (₹5098.90/ha). The variation seen in the cost of seed among categories due to farmers used different types of variety of wheat for sowing. Cost on fertilizer was observed third most expensive input, an average cost on fertilizer was observed ₹4596.57/ha (8.21 per cent) which found to be maximum on a large farm (₹4961.77/ha) followed by medium (₹4780.66/ha), semi-medium (₹4680.78ha), small (₹4358.40/ha) and marginal farm (₹4201.26/ha). The average expenditures on machinery labour were observed ₹5671.52/ha which was highest on the large farm (₹6547.85/ha) and lowest on marginal (₹4818.84/ha) farm which indicates that the cost on machineries labour increase with the increased in the size of the farm. The charges on human labour were observed ₹3520.11/ha (6.29 per cent) which was the highest on the large farm (₹3680.57/ha) and lowest on the marginal farm (₹3253.55/ha). The charges on irrigation were observed at overall farm-level ₹4238.54/ha (7.57 per cent) which was observed ₹3990.75/ha, ₹4160.44/ha, ₹4200.78/ha ₹4402.74/ha, and ₹4437.98/ha on marginal, small, semi-medium, medium, and large farm size respectively. The interest on working capital and land revenue state or village Panchayat tax was observed ₹1971.95/ha (3.52 per cent) and ₹250 /ha (0.45) respectively. The Depreciation cost on repairs of farms implements and machinery were charged ₹1293.11/ha (2.31 per cent) which was increased as the increased size of the farm. Cost A₂ and A₁ are the same which indicates that the leasing pattern of land was not adopted by the sampled farmers. Cost B₁, B₂, C₁, and C₂ were found to be ₹33907.96/ha (60.57 per cent), ₹48407.96 (86.47 per cent), ₹36390.96ha (65.01 per cent) ₹ 50890.96/ha (90.91per cent) respectively. Among the categories cost B₁ B₂, C₁, and C₂ increase with increasing size of the farm.

Table 1: Component wise cost of cultivation of wheat crop in the Indore Block

Particulars	Marginal	Small	Semi Medium	Medium	Large	Overall
Hired human labour charges	3253.55 (6.08)	3419.55 (6.24)	3596.65 (6.43)	3650.22 (6.34)	3680.57 (6.33)	3520.11 (6.29)
Machinery labour charges	4818.84 (9.01)	5121.39 (9.35)	5621.83 (10.05)	6247.71 (10.85)	6547.85 (11.27)	5671.52 (10.13)
Cost of manure	2134.08 (3.99)	2099.74 (3.83)	1680 (3.00)	1837.88 (3.19)	1653.64 (2.84)	1881.07 (3.36)

Cost of Fertilizer	4201.26 (7.85)	4358.40 (7.95)	4680.78 (8.37)	4780.66 (8.30)	4961.77 (8.54)	4596.57 (8.21)
Cost of Seeds	5098.9 (9.53)	5277.53 (9.63)	5564.77 (9.95)	5771.43 (10.03)	5970.11 (10.27)	5536.55 (9.89)
Irrigation charges	3990.75 (7.46)	4160.44 (7.59)	4200.78 (7.51)	4402.74 (7.65)	4437.98 (7.64)	4238.54 (7.57)
Cost of plant protection	2950.00 (5.51)	2886.42 (5.27)	2758.55 (4.93)	2568.46 (4.46)	2468.22 (4.25)	2726.33 (4.87)
Interest on working capital	1851.32 (3.46)	1912.64 (3.49)	1967.24 (3.52)	2048.14 (3.56)	2080.41 (3.58)	1971.95 (3.52)
Depreciation	970.41 (1.81)	1176.65 (2.15)	1320.45 (2.36)	1487.94 (2.58)	1510.11 (2.60)	1293.11 (2.31)
Land revenue	250.00 (0.47)	250.00 (0.46)	250.00 (0.45)	250.00 (0.43)	250.00 (0.43)	250.00 (0.45)
Cost A ₁	29519.11 (55.18)	30662.76 (55.96)	31641.05 (56.58)	33045.18 (57.40)	33560.66 (57.74)	31685.75 (56.60)
Rent paid for lease in land	0.00	0.00	0.00	0.00	0.00	0.00
Cost A ₂	29519.11 (55.18)	30662.76 (55.96)	31641.05 (56.58)	33045.18 (57.40)	33560.66 (57.74)	31685.75 (56.60)
Interest on fixed capital	1889.83 (3.53)	2014.83 (3.68)	2227.33 (3.98)	2428.28 (4.22)	2550.78 (4.39)	2222.21 (3.97)
Sub Total (Cost B ₁)	31408.94 (58.72)	32677.59 (59.64)	33868.38 (60.56)	35473.46 (61.62)	36111.44 (62.13)	33907.96 (60.57)
Rental value of own Land	14500.00 (27.11)	14500.00 (26.46)	14500.00 (25.93)	14500.00 (25.19)	14500.00 (24.95)	14500.00 (25.90)
Sub Total (Cost B ₂)	45908.94 (85.82)	47177.59 (86.11)	48368.38 (86.49)	49973.46 (86.81)	50611.44 (87.07)	48407.96 (86.47)
Imputed value of family labour	2721.43 (5.09)	2631.36 (4.80)	2471.16 (4.42)	2361.48 (4.10)	2229.55 (3.84)	2483.00 (4.44)
Sub Total (Cost C ₁)	34130.37 (63.80)	35308.95 (64.44)	36339.54 (64.98)	37834.94 (65.72)	38340.99 (65.96)	36390.96 (65.01)
Cost C ₂	48630.37 (90.91)	49808.95 (90.91)	50839.54 (90.91)	52334.94 (90.91)	52840.99 (90.91)	50890.96 (90.91)
Cost C ₃ (C ₂ + 10%of C ₂)	53493.41 (100.00)	54789.85 (100)	55923.49 (100)	57568.43 (100)	58125.09 (100)	55980.05 (100.00)

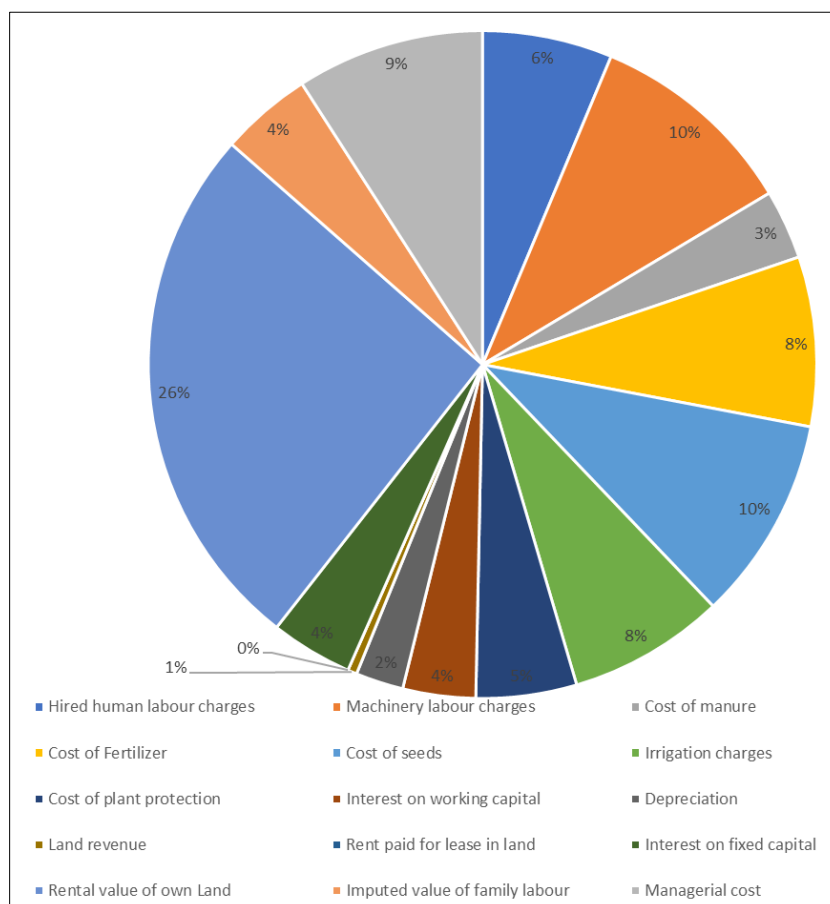


Fig 1: Shows percentage of different cost items in total cost in Indore Block

3.1 Profitability of wheat cultivation

Profitability of wheat crop production in the Indore block was analyzed and results are presented in table 2. It was depicted from the table that an average farmer gained a yield of 35.75 q/ha at their farm, which was found to be maximum on large farms (37.02 q/ha) followed by semi medium (36.89 q/ha), medium (35.18 q/ha), small (34.78/ha) and marginal farms (33.88 q/ha) (Kumar *et al* 2025) ^[7]. The large farmers were found to be sold their produce at the highest rate (₹2300.52 /q) as compared to medium (₹2290.07/q), semi-medium (₹2116.08), small (₹2050.39 q/ha), and marginal farmers (₹1970.66/q). This is indicated that large category farmers received more prices per quintals due to they had more technical knowledge and possessed marketing facilities such as storage etc. and were able to create more time utility in their product. While small and marginal farmers received less price per quintal as compared to large categories farmers. This is due to the distressed sale of the farm produce by small and

marginal farms. The gross income, cost of cultivation, cost of production, net income (Fig 1), farm business income, family labour income, farm investment income, and the benefit-cost ratio at the overall farms level were found to be ₹96830.76/ha, ₹55980.05/ha, ₹1005.71/q, ₹40850.71/ha, ₹62922.80/ha, ₹45939.80/ha, ₹60439.80/ha and 1:1.73 respectively from the cultivation of wheat in the Indore block. The gross income from wheat cultivation was found to be maximum on large farms (₹104270.35/ha) as compared to medium (₹102750.73/ha), semi-medium (₹97886.19/ha), small (₹91840.56/ha), and marginal (₹87405.96/ha). It was also observed from the data that, net income, farm business income, family labour income, farm investment income was found to be maximum on large farms size. The benefit-cost ratio was found to be highest on large size farms (1: 1.79) as compared to medium farms (1:1.78) semi-medium (1:1.75) small (1:1.68) and marginal size of farm (1:1.63).

Table 2: Profitability of wheat in the Indore Block at different size of farm

Particulars	Size of farms					
	Marginal	Small	Semi Medium	Medium	Large	Overall
Yield of main Product (q/ha)	33.88	34.78	36.89	36.18	37.02	35.75
Price of main Product (₹/q)	1970.66	2050.39	2116.08	2290.07	2300.52	2145.54
Value of main Product(₹/ha)	66765.96	71312.56	78062.19	82854.73	85158.35	76830.76
Production of by Product (q/ha)	25.80	25.66	24.78	24.87	23.89	25.00
Price of by product ₹/q	800.00	800.00	800.00	800.00	800.00	800.00
Value of by product ₹/ha	20640.00	20528.00	19824.00	19896.00	19112.00	20000.00
Gross income (₹/ha)	87405.96	91840.56	97886.19	102750.73	104270.35	96830.76
Cost of cultivation (cost C ₃) ₹/ ha	53493.41	54789.85	55923.49	57568.43	58125.09	55980.05
Net income	33912.56	37050.72	41962.70	45182.30	46145.26	40850.71
Cost of production ₹/q	969.70	985.10	978.57	1041.25	1053.92	1005.71
Farm business income	55997.02	59162.97	64017.82	67277.28	68158.91	62922.80
Family labour income	38775.59	42031.61	47046.66	50415.80	51429.36	45939.80
Farm investment income	53275.59	56531.61	61546.66	64915.80	65929.36	60439.80
B:C Ratio at cost C ₃	1.63	1.68	1.75	1.78	1.79	1.73

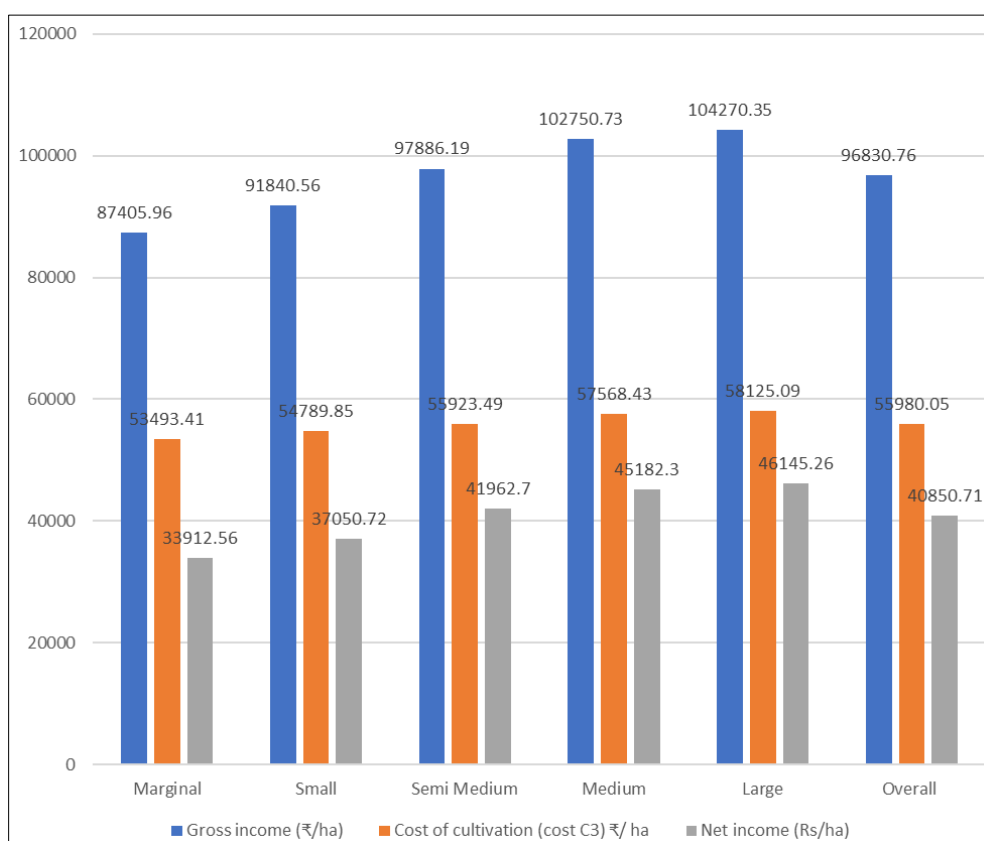


Fig 2: Cost of cultivation, gross income and net income under different size of farm in Indore Block

3.2 Input output ratio of wheat crop over different cost in the Indore block

The input-output (B:C) ratio gives estimates of the return from the investment of one rupee in the production process. The B: C ratio for wheat production over different costs were worked out and the data on the same is presented in table 3. The data on input-output (B: C) ratio indicates that the return from the investment of rupee one in the production of wheat gives more than one rupee return.

Table 3: B:C ratio of wheat over different cost in the Indore Block

Size of farm	Marginal	Small	Semi Medium	Medium	Large	Overall
B:C ratio over cost A ₁	2.96	3.00	3.09	3.11	3.11	3.05
B:C ratio over cost A ₂	2.96	3.00	3.09	3.11	3.11	3.05
B:C ratio over cost B ₁	2.78	2.81	2.89	2.90	2.89	2.85
B:C ratio over cost B ₂	1.90	1.95	2.02	2.06	2.06	2.00
B:C ratio over cost C ₁	2.56	2.60	2.69	2.72	2.72	2.66
B:C ratio over cost C ₂	1.80	1.84	1.93	1.96	1.97	1.90
B:C ratio over cost C ₃	1.63	1.68	1.75	1.78	1.79	1.73

Source: Field survey (Primary data 2023-24)

3.3 Net return over different cost in the Indore Block

Net return was calculated by deducting total cost (Cost C₃) from gross return and results are presented in table 4. it was noted from the table that an average net return over cost A₁, A₂, cost B₁, cost B₂, cost C₁, cost C₂, and cost C₃ was recorded ₹,65145.01 ₹62922.80, ₹48422.80, ₹60439.80, ₹45939.80, ₹35818.64 and ₹40850.71 per ha respectively. The net return over cost A₁ found maximum on a large farm (₹70709.69/ha), followed by medium (₹69705.56/ha), semi-medium (₹66245.15/ha), small (₹61177.80/ha), and marginal size of farm (₹57886.85/ha). Net return over cost B₁ was found in order of ₹55997.02, ₹59162.97, ₹64017.82, ₹67277.28, and ₹68158.91 per hectare on marginal, small, semi-medium, medium, and large farm size respectively. In case of cost, C₁ net return per hectare was found to be maximum on a large farm (₹65929.36) followed by medium (₹64915.80), semi-medium (₹61546.66), small (₹56531.61), and marginal farm size (₹53275.59). Similar trends also followed in cost C₂ and C₃ in the study area.

Table 4: Net returns over different cost under wheat crop in the Indore Block

Size of farm	Marginal	Small	Semi Medium	Medium	Large	Overall
Net return over cost A ₁	57886.85	61177.80	66245.15	69705.56	70709.69	65145.01
Net return over cost A ₂	57886.85	61177.80	66245.15	69705.56	70709.69	65145.01
Net return over cost B ₁	55997.02	59162.97	64017.82	67277.28	68158.91	62922.80
Net return over cost B ₂	41497.02	44662.97	49517.82	52777.28	53658.91	48422.80
Net return over cost C ₁	53275.59	56531.61	61546.66	64915.80	65929.36	60439.80
Net return over cost C ₂	38775.59	42031.61	47046.66	50415.80	51429.36	45939.80
Net return over cost C ₃	33912.56	37050.72	41962.70	45182.30	46145.26	40850.71

Source: Field survey (Primary data 2023-24)

4. Conclusion

It is concluded from the above discussion that average total cost of cultivation of wheat production in the Indore block found to be ₹55980.05 /ha. which was highest on large farm (₹58125.09) followed by medium (₹57568.43), semi medium (₹55923.49), small (₹54789.85) and on marginal farm (₹53493.41/ha). The highest cost at large farm incurred due to large group of farmers invest more money on variable resources. In the component of cost A₁ maximum cost share by machinery labour (₹5671.52 /ha) following by cost on seeds (₹5536.55/ha), human labour (₹3520.11/ha) and, irrigation (₹4238.54/ha). An average farmer gained a yield of 35.75 q/ha at their farm, which was found to be maximum on large farms (37.02 q/ha) followed by semi medium (36.89 q/ha), medium (35.18 q/ha), small (34.78/ha) and marginal farms. The gross income, cost of cultivation, cost of production, net income farm business income, family labour income, and farm investment income, at the overall farms level were found to be ₹96830.76/ha, ₹55980.05/ha, ₹1005.71/q, ₹40850.71/ha, ₹62922.80/ha, ₹45939.80/ha, and ₹60439.80/ha. The average B: C ratio of wheat cultivation in the study area was observed 1: 1.73 which inferred wheat production is profitable in the study area.

References

1. Anonymous. FAOSTAT. 2024-25.

At an average input-output ratio over cost A₁, A₂, B₁, cost B₂, cost C₁, cost C₂, and cost C₃ were found to be 1:3.05, 1:2.85, 1:2.00, 1:2.66, 1:90, and 1:1.73 respectively (Fig 2). The input-output ratio over total costs was found to maximum (1:1.79) at large size farm followed by medium (1:1.78) semi-medium (1:1.75) small (1:1.68) and marginal (1:1.63) respectively. The estimated input-output ratio shows that wheat production was profitable at the overall farm as well as across categories.

(₹61177.80/ha), and marginal size of farm (₹ 57886.85/ha. Net return over cost B₁ was found in order of ₹55997.02, ₹59162.97, ₹64017.82, ₹67277.28, and ₹68158.91 per hectare on marginal, small, semi-medium, medium, and large farm size respectively. In case of cost, C₁ net return per hectare was found to be maximum on a large farm (₹65929.36) followed by medium (₹64915.80), semi-medium (₹61546.66), small (₹56531.61), and marginal farm size (₹53275.59). Similar trends also followed in cost C₂ and C₃ in the study area.

- Anonymous. Agricultural statistics at a glance. Bhopal: Farmers Welfare and Department of Agriculture, Government of Madhya Pradesh; 2024-25.
- Singh G, Kaur J, Kaur S, Kang M, Ankush. Comparative economic analysis of wheat cultivation in Shivalik foothills of Haryana. The Pharma Innovation Journal. 2023;SP-12(11):1537-1540.
- Verma AK, Ahirwar RF, Thakur US. Cost of cultivation and resource use efficiency of major rabi crops in Vidisha district of Madhya Pradesh. Economic Affairs. 2016;61(2):231-237.
- Kumar R, Sahu M, Yadav S, Lamba HK. A study on economic evaluation of paddy cultivation in the Gwalior District (M.P.). International Journal of Statistics and Applied Mathematics. 2023;SP-8(5):695-700.
- Kumar R, Jaulkar AM, Sahu M, Soni A. Economic assessment and profitability analysis of wheat cultivation in Gwalior District, Madhya Pradesh, India. Journal of Experimental Agriculture International. 2025;47(11):86-93. doi:10.9734/jeai/2025/v47i113852.
- Kumar D, Singh J, Kumar S, Sinha P, Panwar S. International Journal of Agriculture and Food Science. 2025;7(8):1347-1350.