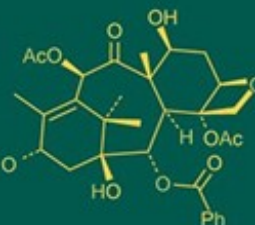


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Economic analysis, profitability and constraints of rapeseed and mustard production in northern hills of Chhattisgarh

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ABSTRACT

The present investigation was undertaken to examine the cost and return structure of rapeseed and mustard cultivation in the Northern Hills region of Chhattisgarh. Primary data were collected from 276 rapeseed-mustard farmers, including 95 marginal, 80 small, 67 medium, and 34 large farmers, selected from 17 villages covering the districts of Surguja, Balrampur, and Jashpur. Data pertaining to the agricultural year 2024–25 was gathered through personal interviews using a pre-tested, well-structured schedule and questionnaire. The results indicated that overall cost of cultivating rapeseed-mustard was ₹35,771.39 per hectare. The cost of cultivation was found to be highest for large farmers (₹38,750.50 per hectare) and lowest for marginal farmers (₹32,860.78 per hectare). Among the various components of cultivation cost, hired labour accounted for the largest proportion (12.77%), followed by family labour (12.14%), machine power (11.01%), manure and fertilizers (7.64%), irrigation charges (5.68%), seed expenditure (2.52%), and plant-protection measures (1.82%). The productivity of rapeseed-mustard in the study area was estimated at 14.75 quintals per hectare. The overall gross return and net return were ₹87,762.50 and ₹51,991.10 per hectare, respectively. The input-output ratio was 1:2.45, indicating favourable economic returns from the crop. Furthermore, the overall cost of production was calculated to be ₹2,428.63 per quintal. Garrett's Ranking Technique showed that the unavailability of the recommended package of practices was the major constraint, scoring 61.07 (Rank I), followed by lack of current technical knowledge with 60.74 (Rank II). Declining production due to continuous cultivation in the same field ranked III (56.09), while disease, insect, and pest infestation ranked IV (55.93). Non-availability of quality seed and suitable varieties ranked V (54.25), followed by insufficient irrigation facilities at Rank VI (52.65) and inadequate funds at Rank VII (49.76). Lack of soil-testing facilities ranked VIII with the lowest score of 47.04.

Keywords: Cost and returns, Input-output ratio, Gross income, Net return, Garrett's Ranking Technique

Introduction

Oilseeds constitute the second-largest agricultural commodity group in India and play a significant role in the country's agricultural economy. Oilseeds account for approximately 13–14 per cent of the gross cropped area, contribute about 1.4 per cent to GDP, and represent nearly 8 per cent of the total value of agricultural products, ranking next to cereals (Hegde, Agricultural Yearbook, 2010). India is the world's fourth-largest producer of oilseeds, contributing around 10 per cent of global oilseed production, 6–7 per cent of vegetable oil production, and nearly 7 per cent of protein meal production. According to the Directorate of Economics and Statistics (2025), oilseeds were cultivated over an area of 29.73 million hectares in India, producing 36.59 million tonnes with an average productivity of 1,332 kg per hectare. Rapeseed and mustard are among the major rabi oilseed crops cultivated in India and make a substantial contribution to domestic edible-oil production as well as agricultural income. In Chhattisgarh, these crops are cultivated across various agro-climatic regions, including the Northern Hills, where farming is predominantly characterized by small and fragmented landholdings, dependence on rainfall, and diverse soil conditions. The state is broadly divided into three major agro-climatic zones, namely the Chhattisgarh Plain, Bastar Plateau, and Northern Hills. Among these, the Northern Hills possess significant potential for the expansion of rabi oilseed cultivation. Recent studies conducted in Chhattisgarh suggest that rapeseed-mustard cultivation has favourable economic prospects; however, increasing input costs, along with technological and marketing constraints, continue to influence the profitability and overall sustainability of production.

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Materials and Methods

The study pertained to the agricultural year 2024–25 and was carried out in the Surguja, Balrampur, and Jashpur districts of the Northern Hills region of Chhattisgarh. Respondents from the selected villages were chosen randomly by adopting a proportionate sampling technique, with 25 per cent of the farmers selected from each village. Both primary and secondary data were utilized for analysis and interpretation. Primary information was collected from 276 respondents through personal interviews using a pre-tested and structured schedule. Based on the data obtained, the cost of cultivation, returns, and profitability of rapeseed and mustard production were estimated using various cost concepts, namely Cost A₁, Cost A₂, Cost B₁, Cost B₂, Cost C₁, Cost C₂, Cost C₃, and Cost A₂ + FL. To assess the economic returns from rapeseed and mustard cultivation, different measures of farm income were calculated, including gross income, net income, farm business income, family labour income, farm investment income, net returns, and the benefit-cost ratio. These measures were used to evaluate the overall economic performance and profitability of rapeseed and mustard cultivation in the study area.

Concepts used

Cost concept: The different cost components used in the analysis were as follows.

Variable cost: It includes labour cost, seed cost, fertilizer cost, plant protection chemical cost, irrigation cost and interest on working capital.

Fixed cost: It includes interest on fixed capital, land revenue and other taxes, rental value of owned land and depreciation on farm implements and farm buildings

Cost A₁ = includes Value of seed, Value of fertilizer, Value of Plant protection chemical, Value of human labour, Irrigation charges, Depreciation on farm implements, Interest on working capital, Land revenue and other expenses

Cost A₂ : Cost A₁ + Rent paid 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 B₂ + imputed value of family labour

Cost C₃ : Cost C₂ + 10 per cent of cost C₂ taking as managerial allowances

Cost A₂ + FL = Cost A₂ + Imputed value of family labour

Interest on working capital: It was calculated @7% per annum for half of the crop period.

Interest on fixed capital: It was calculated @8% per annum for the crop period.

Rental value of owned land: It was calculated based on the prevailing rates in the sampling villages.

Depreciation: It presents the value by which a farm resource decreased in value as a result of cause other than a change in general price of the item. Straight line method was used for calculating the depreciation

$$\text{Depreciation} = \frac{\text{Purchase value of asset} - \text{junk value}}{\text{No. of useful years of life (expected life)}}$$

Income Measures:

Gross Income = Value of total output

Farm business income = Gross income – the cost A₁ or cost A₂

Family labour income = Gross Income - Cost B₂

Farm investment Income = Farm business income - Imputed value of family labour

$$\text{Cost of production (Rs. / qt.)} = \frac{\text{Total Cost}}{\text{Yield}}$$

Net income = Gross income – Cost C₂

Input-output ratio = Gross returns/Total cost of Cultivation

Analysis of constraints

To find out constraints for production of oilseeds grown by farmers Garret's ranking technique was used.

$$\text{Percent position} = 100 \times (R_{ij} - 0.5) / N_j$$

Where,

R_{ij} = Rank given for the constraint by jth respondents

N_j = Number of constraints ranked by jth respondents

Results and Discussion

The results of the study have been presented as under:

Cost of cultivation of

Rapeseed-Mustard

The present study was undertaken to estimate the cost and returns associated with rapeseed and mustard cultivation among respondent farmers from 17 villages across the Surguja, Balrampur, and Jashpur districts of the Northern Hills region of Chhattisgarh. The per-hectare cost of cultivation incurred by the sample farmers is presented in Table 1. The cost of cultivating rapeseed and mustard was highest on

large farms, amounting to Rs. 38,750.50 per hectare, while it was lowest on marginal farms at Rs. 32,860.78 per hectare. An increasing trend in the cost of cultivation was observed from marginal to large farmers. This may be attributed to the greater expenditure incurred by large farmers on modern agricultural inputs, including quality seeds, fertilizers, plant protection chemicals, hired labour, and other farm inputs. Among the various components of cultivation cost, human labour accounted for the largest share, constituting 24.92 per cent of the total cost of cultivation. Out of this, hired human labour alone contributed 12.77 per cent. The overall variable cost accounted for 55.45 per cent of the total cost, whereas fixed costs constituted 44.54 per cent. Among the fixed-cost components, the rental value of land represented the largest share, accounting for 41.93 per cent of the total cost of cultivation.

Table 1. Cost of cultivation of Rapeseed and Mustard across different category of Farmers

						(Rs. /Ha.)
S. No	Particulars	Farmer's category				Overall
		Marginal	Small	Medium	Large	
(A)	Variable cost					
1	Material cost					
	Seed	827.12	870.78	931.14	972.95	900.50
		(2.52)	(2.50)	(2.53)	(2.51)	(2.52)
	Manures and fertilizer	2068.49	2747.47	2937.69	3169.28	2730.73
		(6.29)	(7.90)	(8.00)	(8.18)	(7.64)

(continued on next page)

						(Rs. /Ha.)
2	Plant protection	556.01 (1.69)	608.43 (1.75)	688.85 (1.88)	749.39 (1.93)	650.67 (1.82)
	Irrigation	1593.66 (4.85)	1831.46 (5.27)	2189.96 (5.96)	2504.36 (6.46)	2029.86 (5.68)
	Total material cost	5045.28 (15.35)	6058.14 (17.42)	6747.64 (18.38)	7395.98 (19.08)	6311.76 (17.64)
	Human labour					
	Family labour	5018.64 (15.27)	4525.28 (13.02)	4318.86 (11.76)	3518.32 (9.08)	4345.27 (12.14)
	Hired labour	3508.85 (10.67)	4154.49 (11.95)	4795.12 (13.06)	5821.99 (15.02)	4570.11 (12.77)
	Total human labour	8527.49 (25.95)	8679.77 (24.97)	9113.98 (24.83)	9340.31 (24.10)	8915.38 (24.92)
	Machine power	2879.78 (8.76)	3488.76 (10.03)	4168.25 (11.35)	5225.13 (13.48)	3940.48 (11.01)
	Interest on working capital	575.84 (1.75)	637.93 (1.83)	701.04 (1.91)	768.65 (1.98)	670.86 (1.87)
	Total Variable costs	17028.39 (51.82)	18864.6 (54.26)	20730.91 (56.47)	22730.07 (58.66)	19838.49 (55.45)
(B)	Fixed cost					
1	Depreciation	215.45 (0.65)	280.23 (0.81)	356.45 (0.97)	396.26 (1.02)	312.10 (0.87)
2	Land revenue	8 (0.02)	8 (0.02)	8 (0.02)	8 (0.02)	8 (0.02)
3	Rental value of owned land	15000 (45.65)	15000 (43.15)	15000 (40.86)	15000 (38.71)	15000 (41.93)
4	Interest on fixed capital	608.94 (1.85)	611.53 (1.76)	614.58 (1.67)	616.17 (1.59)	612.81 (1.71)
	Total Fixed Cost	15832.39 (48.18)	15899.76 (45.73)	15979.03 (43.53)	16020.43 (41.34)	15932.9 (44.54)
(C)	Total cost (A+B)	32860.78 (100)	34764.36 (100)	36709.94 (100)	38750.5 (100)	35771.39 (100)

Note- Fig. in parenthesis indicates the percentages to the total cost

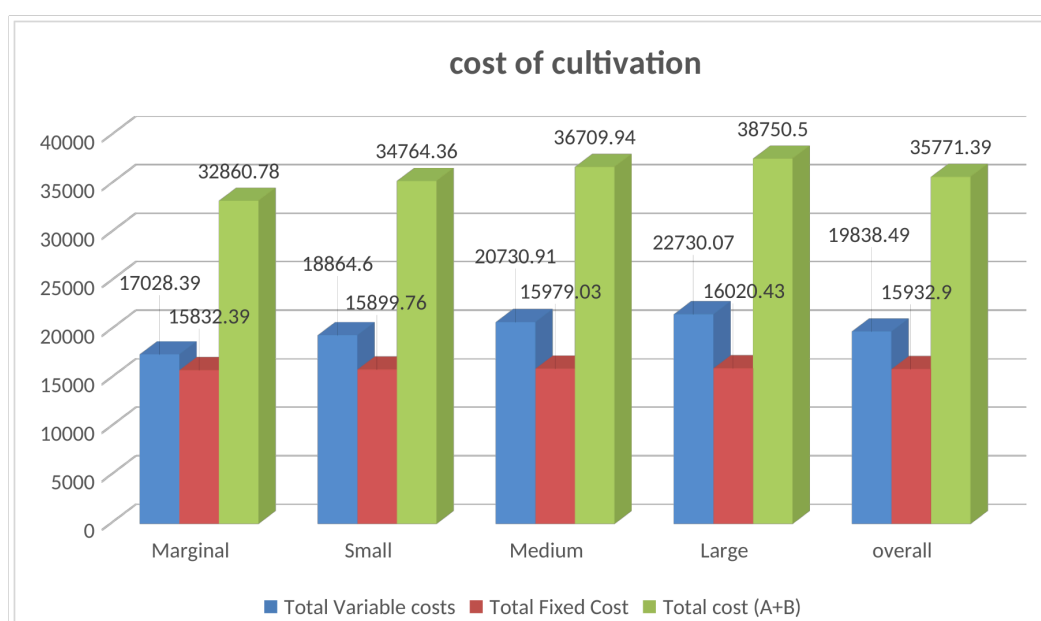


Figure 1. Total Cost of rapeseed and mustard cultivation for different size group of sampled households (Rs. /ha.)

Returns from rapeseed and mustard production

The overall cost of cultivation of rapeseed and mustard was estimated at Rs. 35,771.39 per hectare. The corresponding net income, family labour income, and farm business income were Rs. 51,991.10, Rs.

71,336.38, and Rs. 71,949.18 per hectare, respectively. The gross income obtained from the main produce was Rs. 87,762.50 per hectare, showing an increasing trend with the increase in farm size from marginal to large farms. Net income was highest among large farmers, at Rs. 58,770 per hectare, whereas marginal farmers recorded the lowest

net income of Rs. 45,560.22 per hectare. The overall input-output ratio for rapeseed and mustard cultivation was estimated at 1:2.45, indicating that every rupee invested generated a return of Rs. 2.45. The increase in productivity from small to large farms was associated with higher expenditure on agricultural inputs, which influenced the input-

output ratio. In addition, family labour was observed to be utilized more efficiently on the farms. Marginal farmers relied more heavily on family labour than on hired labour, while the contribution of family labour declined progressively as farm size increased.

Table 2. Returns from Rapeseed and mustard production across different farmer's category

S. No	Particulars	Farmer's category				Overall
		Marginal	Small	Medium	Large	
1	Cost of cultivation (Rs./ha)	32860.78	34764.36	36709.94	38750.5	35771.39
2	Yield (q./ha.)	13.18	14.34	15.09	16.39	14.75
3	Price (Rs./q)	5950	5950	5950	5950	5950
4	Gross return (Rs./ha)	78421	85323	89785.5	97520.5	87762.5
5	Net Return (Rs./ha)	45560.22	50558.64	53075.56	58770	51991.10
6	Farm business income (Rs./ha)	66187.8	70695.45	73009	77904.49	71949.18
7	Family labour income (Rs./ha)	65578.86	70083.92	72394.42	77288.32	71336.38
8	Farm investment income (Rs./ha)	61169.16	66170.17	68690.14	74386.17	67603.91
9	Cost of production (Rs./q)	2493.23	2424.29	2432.73	2364.27	2428.63
10	Input-output ratio	1:2.38	1:2.45	1:2.44	1:2.51	1:2.45

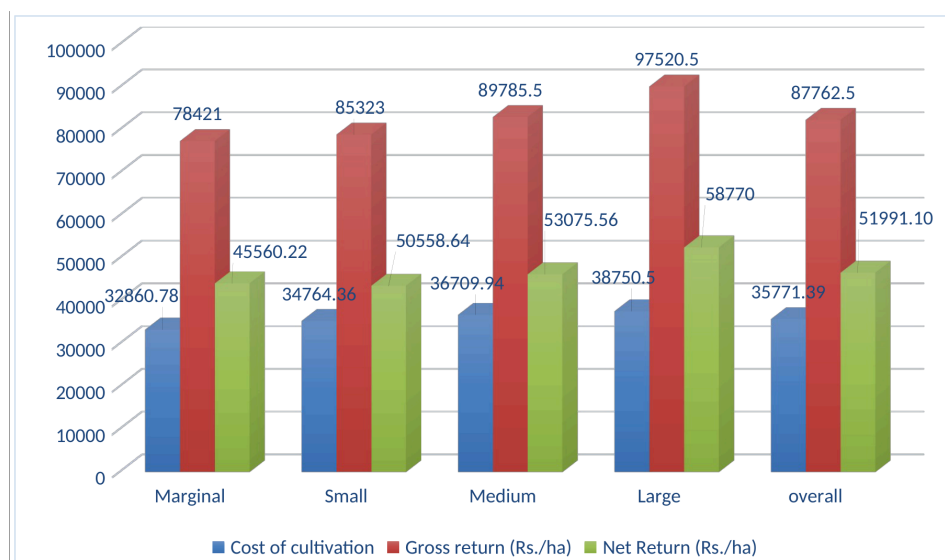


Figure 2. Cost of cultivation, gross return and net returns of different size group of sampled households (Rs. /ha.)

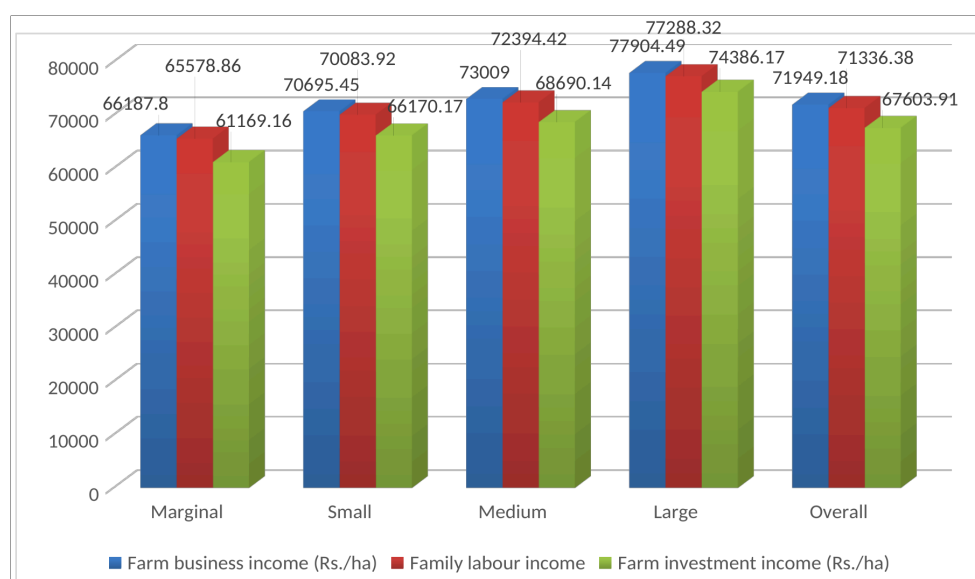


Figure 3. Farm business income, Family labour income and Farm investment income of different size group of sampled households (Rs. /ha.)

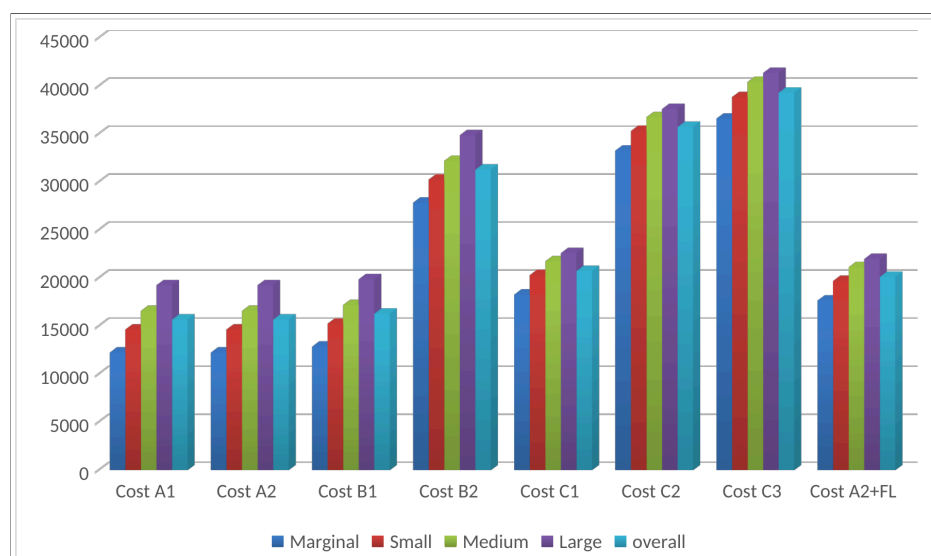
Cost and returns as per CACP cost concepts**Cost of rapeseed and mustard cultivation as per CACP cost concepts**

The cost of rapeseed and mustard production based on CACP cost concepts is presented in Table 3 and Figure 4. The analysis indicates that, on an average basis, the costs under Cost A₁, Cost A₂, Cost B₁, Cost B₂, Cost C₁, Cost C₂, Cost C₃, and Cost A₂ + FL were estimated

at Rs. 15,813.32, Rs. 15,813.32, Rs. 16,426.12, Rs. 31,426.12, Rs. 20,771.40, Rs. 35,771.40, Rs. 39,348.53, and Rs. 20,158.59 per hectare, respectively, on the sample farms. An imputed rental value of Rs. 15,000 was assigned to owned land for one cropping season. The cost under Cost A₁ exhibited an increasing trend with the rise in farm size from marginal to large farms. This increase can be attributed to the greater utilization of hired labour, plant protection chemicals, manure, fertilizers, and other agricultural inputs by larger farmers.

Table 3. Cost of cultivation in terms of Cost Concepts under sampled farms

S. No	Particulars	Farmer's category				Overall
		Marginal	Small	Medium	Large	
1	Cost A ₁	12233.2	14627.55	16776.5	19616.01	15813.32
2	Cost A ₂	12233.2	14627.55	16776.5	19616.01	15813.32
3	Cost B ₁	12842.14	15239.08	17391.08	20232.18	16426.12
4	Cost B ₂	27842.14	30239.08	32391.08	35232.18	31426.12
5	Cost C ₁	17860.78	19764.36	21709.94	23750.5	20771.4
6	Cost C ₂	32860.78	34764.36	36709.94	38750.5	35771.4
7	Cost C ₃	36146.86	38240.796	40380.934	42625.55	39348.53
8	Cost A ₂ +FL	17251.84	19152.83	21095.36	23134.33	20158.59

**Figure 4.** Cost concepts estimation of rapeseed-mustard cultivation in sample households**Income over different CACP cost concepts**

Returns obtained over different costs of rapeseed and mustard on sample farms in the study area has been worked out and presented in table 4. The overall income over the Cost A₁, Cost A₂, Cost B₁, Cost

B₂, Cost C₁, Cost C₂, Cost C₃ and Cost A₂+ FL calculated was estimated to be Rs. 71949.19, Rs. 71949.19, Rs. 71336.38, Rs. 56336.38, Rs. 66991.11, Rs. 51991.11, Rs. 48413.97 and Rs. 67603.91 per hectare, respectively.

Table 4. Income over different CACP cost

S. No	Particulars	Farmer's category				Overall
		Marginal	Small	Medium	Large	
1	Cost A ₁	66187.8	70695.45	73009	77904.49	71949.19
2	Cost A ₂	66187.8	70695.45	73009	77904.49	71949.19
3	Cost B ₁	65578.86	70083.92	72394.42	77288.32	71336.38
4	Cost B ₂	50578.86	55083.92	57394.42	62288.32	56336.38
5	Cost C ₁	60560.22	65558.64	68075.56	73770	66991.11
6	Cost C ₂	45560.22	50558.64	53075.56	58770	51991.11
7	Cost C ₃	42274.142	47082.204	49404.566	54894.95	48413.97
8	Cost A ₂ +FL	61169.16	66170.17	68690.14	74386.17	67603.91

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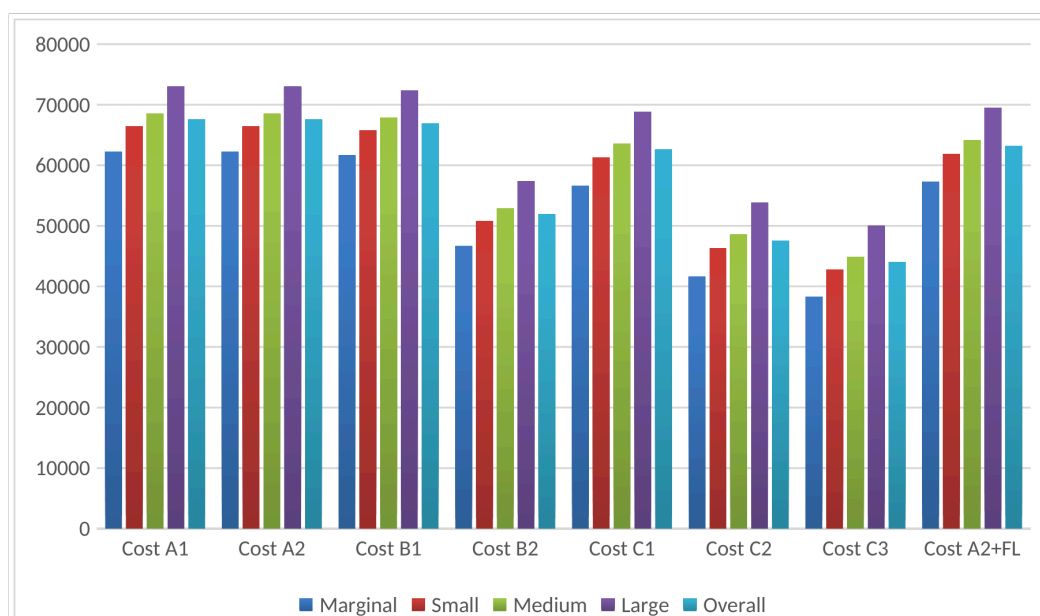


Figure 5. Returns over different cost at sampled farms

Constraints faced by producers in production of oilseeds in study area

The results of Garrett's Ranking Technique indicated that non-availability of recommended package of practices constituted the most significant constraint, obtaining the highest Garrett score of 61.07 and securing Rank I. This was followed by the lack of updated technical knowledge regarding crop production, which was ranked II with a score of 60.74. The problem of declining yield due to continuous cultivation of the crop in the same field was ranked III, with a score of

56.09. Similarly, disease, insect, and pest infestation was identified as the fourth most important constraint, receiving a score of 55.93. The non-availability of good-quality seed and suitable varieties, which adversely affected germination and contributed to a high mortality rate, was ranked V with a score of 54.25. The inadequate irrigation facilities were ranked VI, recording a score of 52.65. Insufficient funds constituted the seventh-ranked constraint, with a score of 49.76. The lack of soil-testing facilities, which contributed to the application of inadequate quantities of fertilizers, was ranked VIII and recorded the lowest score of 47.04.

Table 5. Production constraints faced by oilseed growers

S. No.	Particulars	Averages	Rank
1	Non-availability of recommended package of practices	61.07	I
2	Absence of latest technical knowledge about the crop	60.74	II
3	Decreasing yield due to growing the crop regularly in same field	56.09	III
4	Problem of disease/insect/pest	55.93	IV
5	Non-availability of good variety	54.25	V
6	Inadequate irrigation facilities	52.65	VI
7	Insufficient funds	49.76	VII
8	Absence of facilities for soil testing	47.04	VIII

Conclusion

The study revealed that the overall cost of cultivation of rapeseed and mustard was ₹35,771.39 per hectare, with an average yield of 14.75 q/ha and a cost of production of ₹2,428.63 per quintal. The input-output ratio was 1:2.45, indicating profitable cultivation. Seed, fertilizer, human labour, and rental value of owned land were the major contributors to total cost. The crop has good potential in the study area and can contribute to reducing the demand–supply gap in edible oils. The major constraints identified were non-availability of recommended production practices followed by lack of technical knowledge, declining yield from continuous cultivation, pest and disease problems, lack of quality seed and suitable varieties, inadequate irrigation, insufficient funds, and lack of soil-testing facilities. Timely availability of quality inputs, improved technologies, technical training, and affordable inputs can enhance productivity, profitability, and farmers' livelihoods.

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