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Cost and returns of mustard cultivation: An analytical overview

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Abstract

Mustard has emerged as a vital oilseed crop due to its favourable adaptability to various climatic conditions, its significance as a cooking medium in human diets, and its diverse industrial applications stemming from both its primary and by-products. Because of its low cultivation costs and high market value, mustard can thrive in conditions of water scarcity and poor soil fertility, making it an attractive alternative for farmers, particularly in the Rabi season, as a substitute for wheat. Recognizing the crop's importance, a study was conducted to analyze the economic of mustard production in proportionate Lakhimpur district, Uttar Pradesh. Seventy respondents were selected using a purposive cum random sampling method from seven villages within the Kumbhi block. Primary data was collected through personal interviews based on a pre-structured schedule. The analysis employed both tabular and functional methods to derive conclusions. Respondents were classified into marginal, small, and large farms. It was observed that cultivation costs increased with farm size, with the highest production cost for large farms amounting to Rs.51411.71 per hectare. The largest expense in mustard cultivation was attributed to manure and fertilizer, which accounted for Rs.5450.28 per hectare, while the overall cost of cultivation averaged Rs. 44,835.53 per hectare. On average, the gross income was recorded at Rs. 121711.30, resulting in a net income of Rs. 76875.58. Large farms reported the highest gross income at Rs. 141022.60. The overall input-output ratio for mustard crop was calculated as 1:2.70 ultimately, mustard cultivation was determined to be profitable, with potential for increased profits per unit of time and area, provided that production and marketing constraints are addressed.

Keywords: Cost of cultivation, gross return and input-output ratio of mustard crop

Introduction

Mustard (*Brassica* spp.), a versatile crop with significant agricultural economic and nutritional value, has been cultivated for centuries across various regions of the world. As a member of the Brassicaceae family, mustard includes several species such as white mustard (*Sinapis alba*), brown mustard (*Brassica juncea*), and black mustard (*Brassica nigra*), each valued for its seeds, oil, and condiments. It is a prominent oilseed crop, holds significant economic and nutritional value globally. Beyond its culinary uses, mustard plays an essential role in agro-ecological systems, functioning as a bio fumigant and cover crop, while also being a source of antioxidants, glucosinolates, and essential fatty acids. Its derivatives such as mustard oil and meal are widely consumed and used in various industries. As demand for oilseeds continues to grow, understanding the cost and return dynamics of mustard farming becomes increasingly essential for policymakers, farmers, and agribusiness stakeholders. Mustard is predominantly a Rabi (winter) crop, sown from October to November and harvested from February to March. Mustard plays a significant role in the agricultural economy of India, being one of the most important oilseed crops in the country. Rapeseed -Mustard

is accounts in 30.3% of the acreage and 33.2% of the production from nine oilseed crops in India (2023-24). Mustard has become the first largest oilseed crop in production (13.2 million tons) in India (2023-24). Rajasthan (45.40%), Uttar Pradesh (14.24%), Madhya Pradesh (13.28), Haryana (10.78) and WB (6.0) are the leading states in mustard production during 2023-24 (IACR-DRMR). Rapeseed-Mustard crops in India are grown in diverse agro climatic conditions. Uttar Pradesh becomes rank 2nd after Rajasthan in production (DRMR-2023-24). Among all top five districts of Uttar Pradesh, Lakhimpur Kheri is third highest district after Agra and Mathura (District Statistical Bulletin:2019-20). In this district mustard is grown in 27343 hectare while productivity was 9.97 qtl/ha. Mustard is grown throughout Uttar Pradesh, with significant cultivation occurring in 46 districts. Researchers have developed numerous varieties aimed at reducing the import costs of oilseeds by enhancing yield. Accurate information regarding the profitability of mustard production is essential for creating effective policies related to research and development, pricing strategies, restructuring the marketing system, and prioritizing the cultivation of this nutritious crop. In light of this context, this study concentrated on

analyzing profitability and resource use efficiency, while also identifying the challenges faced by farmers engaged in mustard cultivation. Diseases and pest attack, low price of output, weed infestation, non-availability of credit and high price of inputs were the major impediments of mustard seed production (Nityananda Layek *et al.* 2021)^[4].

Research Methodology

The study was conducted in the Lakhimpur Kheri district of U.P. In research, multistage-cum random sampling approach was utilized to select the district, blocks, villages, and participants. Initially, the Lakhimpur Kheri district in Uttar Pradesh was chosen purposefully. This district comprises 15 blocks, among which the Lakhimpur block was selected due to the predominance of mustard cultivation among its farmers. A comprehensive list of all villages within this block was compiled, detailing their area and production of mustard crop. Seven villages namely Jadaura, Ajan, Belabojhi, Sikandrabad, Bansgaon, Kotkherwa and Hayatpur were specifically chosen for their high concentration of mustard farmers. A distinct list of mustard growers from these selected villages was created, including information on their landholdings sourced from records available at the Tehsil level. These growers were then categorized into three groups based on their land size: marginal (<1ha), small (1-2ha), and large (more 2 ha). Ultimately, 70 respondents were selected using a proportionate random sampling technique. Primary data were gathered through a meticulously designed schedule via personal interviews with the chosen mustard growers. Secondary data were sourced from various published materials, including reports from district and block offices. Cost-benefit analysis and regression models to assess the relationship between inputs and profitability were employed

to derive meaningful conclusions.

Weighted Mean

$$W.A. = \frac{W1 X1 + W2 X2 + Wn Xn}{W1 + W2 + W3 \dots Wn}$$

Where,

$$(i) \frac{\sum_{i=1}^n W_i \times X_i}{\sum_{i=1}^n W_i}$$

Input-Output Ratio

$$\text{Input Output Ratio} = \frac{\text{Total Gross Return per unit}}{\text{Total cost per unit}}$$

$$I/O = \frac{Py}{Px}$$

Where,

I/O= Input-Output Ratio

Py = Total Gross Return in Rs.

Px = Total cost in Rs.

Results and Discussion

1. Total cost of cultivation of mustard per hectare

The total cost of cultivation on mustard crop is calculated in per hectare occupied land by different size of group of farmers such as marginal, small and large farmers.

Table 1: Total cost of cultivation of mustard per hectare:

S.N.	Particulars	Size group of farms			Overall
		Marginal	Small	Large	
1	Human labour	4500	4750	5000	4685.71
a.	Family labour	2750	2000	2000	2364.28
b.	Hired labour	1750	2750	3000	2321.42
2	Tractor charge	3850	4150	4550	4095.71
3	Seed	470	500	520	490
4	Manure & fertilizer	5064	5568	6124	5450.28
5	Irrigation	2150	2250	2400	2235.71
6	Plant protection	820	902	992	882.74
7	Total variable cost	16854	18120	19586	17840.17
8	Interest on working capital@5	842.7	906	979.3	892
A.	Total operational cost	17696.7	19026	20565.3	18732.11
B.	Rental value of land	15000	15000	15000	15000
Overhead cost					
	Interest on fixed capital	4719.37	5069.37	7923.2	5551.67
	Repair to dead stock	2831.62	3041.62	4753.92	3331
	Depreciation	1887.75	2027.74	3169.28	2220.65
C.	Total@6	9438.75	10138.74	15846.41	11103.26
	Total Cost (A+B+C)	42135.45	44164.74	51411.71	44835.53

Table 1 revealed total cost of cultivation on mustard crops of different categorised 'farmer, the highest cost of cultivation of mustard crop is incurred by large farmers group with amount Rs.51411.71 per hectare and followed by small and marginal farmers with amount in Rs. 44164.74 and 42135.45 respectively. The average cost of cultivation

of mustard crop incurred in Rs. 44835.53 per hectare. Out of total variable cost of cultivation, manure and fertilizer shared highest amount in Rs. 5064, 5568 and 6124 per hectare under marginal, small and large farmers respectively. The average total variable cost of mustard crop is incurred within amount Rs. 5450.28 per hectare.

2. Total cost of cultivation of mustard per farm:

The total cost of cultivation on mustard crop is calculated in

per farm occupied land by different size of group of farmers such as marginal, small and large farmers.

Table 2: Total cost of cultivation of mustard crop per farm (Rs/farm)

S. No.	Particular	Size group of farms			Overall average
		Marginal	Small	Large	
1	Human labour	3015	7125	15100	6951.57
a.	Family labour	1842.5	3000	6040	3132.64
b.	Hired labour	1172.5	4125	9060	3818.92
2	Tractor charge	2579.5	6225	13741	6172.27
3	Seed	314.9	750	1570.4	726.18
4	Manure & fertilizer	3392.88	8352	18494.48	8261.56
5	Irrigation	1440.5	3375	7248	3320.64
6	Plant protection	549.4	1353	2995.84	1338.13
7	Total variable cost	11292.18	27180	59149.72	26770.27
8	Interest on working Capital	564.6	1359	2957.49	1338.52
A.	Total operational cost	11856.78	28539	62107.2	28108.79
B.	Rental value of land	10050	22500	45300	21664.28
Overhead cost					
	Interest on fixed capital	3161.97	7604.05	23928.07	9177.63
	Repair to dead stock	1897.18	4562.43	14356.84	5506.59
	Depreciation	1264.77	3041.62	9571.23	3671.06
C.	Total	6323.87	15208.11	47856.15	18355.31
	Total cost (A+B+C)	28230.65	66247.11	155263.4	68128.54

Per Farm means Total land area is divided by number of respondents under different categories farmers

Table 2 is analysed for cost of cultivation of mustard crop on different categorised farmers under per farm unit. Total cost of cultivation in amount of rupees is 28230.65, 66247.11 and 155263.4 under marginal, small and large farmers respectively. The Average cost of cultivation of

mustard crop in amount of rupees is 68128.54 per farm.

3. Cost and Return from mustard crop (Rs/ha):

Total cost and return on the mustard crop are calculated in rupees per hectare of categorised different size of farmers.

Table 3: Cost and Return from mustard crop (Rs/ha):

Particulars	Size of group			Overall
	Marginal	Small	Large	
Seed rate (kg/ha)	4.7	5	5.2	4.9
Yield of main product (q/ha)	16.53	17.4	20.6	17.7
Price of main product (kg/ha)	6500	6500	6500	6500
Yield of by product (q/ha)	46.28	50.46	52.76	50.78
Price of by product (q/ha)	135	135	135	135
Return from main product (Rs/q)	107445	113100	133900	113621.9
Return from by product (Rs/q)	6237	6812.1	7122.6	6603.74
Gross income	113682	119912.1	141022.6	121711.3
Total input cost	42135.45	44164.74	51411.71	44835.53
Net income	71546.55	75747.4	89610.89	76875.58
Input output ratio	01:2.7	1:2.7	1:2.7	1:2.7

Table 3 revealed total gross return of mustard crop in amount of rupees 113682, 119912.1 and 141022.6 per hectare under marginal, small and large farmers respectively. The average gross return of mustard crop is Rs. 121711.3 per hectare. The Input-Output ratio is same within 1:2.7 under different categorized of farmers.

4. Cost and Return from mustard crop per farm (Rs/farm)

Total cost and return on the mustard crop are calculated in rupees per farm of categorised different size of farmers.

Table 4: Cost and Return from mustard crop per farm (Rs/farm)

Particulars	Size group of farms			Overall average
	Marginal	Small	Large	
Seed rate (kg/ha)	3.15	7.5	15.7	7.26
Yield of main product(q/ha)	11.07	26.1	62.212	27.05
Yield of by product(q/ha)	4355	9750	19630	9387.86
Rate of main product (Rs/q)	31	75.69	159.33	73.1
Rate of by product (Rs/q)	90.45	202.5	407.7	194.98
Return from main product (Rs/q)	71988.15	169650	404378	175866.4
Return from by product (Rs/q)	4178.79	10218.15	21510.25	9865.8
Gross income	76166.94	179868.2	425888.3	185732.2
Total input cost	28230.75	66247.11	155263.4	68128.6
Net income	47936.19	113621.1	270624.9	117603.6
Input output ratio	01:02.7	01:02.7	01:02.7	01:02.7

Per Farm means Total land area is divided by number of respondents under different categories farmers.

Table 4 is revealed total gross return of mustard in Rs. 76166.94, 179868.2 and 425888.3 crops per farm under marginal, small and large farmers respectively. The average gross return is 185732.2 per farm. The Input-Output ratio is also same within 1:2.7 under different categorized of farmers.

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Conclusion

Mustard cultivation offers substantial returns relative to its moderate production costs, making it an attractive option for farmers in oilseed-dominant regions. The cost of cultivation per hectare of mustard was Rs. 42135.45 on marginal size group, Rs. 44164.74 on small and Rs. 51711.71 on large size group of farms. The per hectare input cost being Rs. 42135.45 per hectare on marginal farms was lower as compared to Rs. 44164.74 per hectare on small farms and Rs. 51411.71 per hectare on large farms. Total average cost was Rs. 44835.53 per hectare. The net returns were highest of large hectare Rs. 89610.89 followed by small farms and marginal farms Rs. 75747.40 and Rs. 71546.55 respectively. Total average net return was Rs. 76875.58 per hectare. The input and output ratio of cultivated mustard crop in per hectare under all categories farmers is 01:02.7.

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