



International Journal of Research in Agronomy

E-ISSN: 2618-0618

P-ISSN: 2618-060X

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www.agronomyjournals.com

2024; SP-7(9): 610-613

Received: 04-06-2024

Accepted: 11-07-2024

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Economic analysis of mustard production in Bhandara district

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DOI: <https://doi.org/10.33545/2618060X.2024.v7.i9Si.1555>

Abstract

This study has attempted to examine the economic analysis of Mustard production in Bhandara district. The study was conducted in Sakoli and Mohadi tehsils of Bhandara district. A sample size of 100 farmers from five villages were randomly selected to assess cost of cultivation and resource use efficiency. Primary data were collected through personal interviews by using a pretested schedule of rabi mustard for the year 2023-24. Data were analyzed by using tabular methods and to estimate cost and returns standard cost concepts was used, while Cobb-Douglas production functions and Marginal Value Product (MVP) were employed to evaluate resource use efficiency. The per-hectare production costs varied: at cost 'A₁' and 'A₂' were Rs. 17,652.31, cost 'B₁' was Rs. 18,305.65, cost 'B₂' was Rs. 24,930.97, cost 'C₁' was Rs. 22,587.26, cost 'C₂' was Rs. 29,212.58, and cost 'C₃' was Rs. 32,133.83. The average gross return was Rs. 40,085.43, with an input-output ratio of 1:1.24 at cost 'C₃'. The R² value for the Cobb-Douglas production function was 0.828. Significant coefficients were observed for, plant protection at 0.973 and phosphorus at 1.017 were positively significant to gross income at 1 per cent and 5 per cent level of significance respectively, and manures at -0.044 was negatively significant to gross income at 5 per cent level of significance.

Keywords: Mustard, costs, returns, cobb douglas production function, MVP

Introduction

Mustard is a highly important crop among the oilseed crops grown in the country. It is grown in India in diverse agroclimatic conditions ranging from north eastern, north western hills to down south under irrigated/rain-fed, timely/late sown, saline soils and mixed cropping. It multiplies quickly in temperate climates. The seedlings are planted in between the end of September - October, and harvested towards the end of February - March. Mustard seeds have high energy content, having 28-32 per cent oil with a relatively high protein content of 28-36 per cent. It is used to make oil and its waste is used for feeding animals.

India is the third largest producer of mustard production accounting for 11 per cent of the total mustard production. Indian mustard accounts for about 10.00 million ha and the production is 12.00 million tonnes during 2023-24. At the same time, yield remains only 1200 kg per ha. In India, major mustard production states are Rajasthan (44.97 per cent), Haryana (12.44 per cent), Madhya Pradesh (11.32 per cent), and Uttar Pradesh (10.60 per cent). Rajasthan is the highest mustard producing state in India producing 4.60 million tonnes. (Ministry of Agriculture and Farmers Welfare, Govt. of India, 2024). In Maharashtra mustard area under mustard was about 212770 hectares and total production was 12.6 million tones and a productivity of 3.84 kg/ha during 2023-24 (Economic survey of Maharashtra, 2023-24). The total cultivated area under mustard crop in Bhandara district was 2.08 lakh hectares during the 2023-24. In Bhandara district area under mustard was about 802.00 hectares. (SAO Office Bhandara, 2023-2024).

Very few studies have been conducted in the past to examine the production and resource use efficiency of mustard in the Bhandara district and so looking to above facts, a study is essential to undertake through which a detailed insight can be obtained to analyze the cost of production and resource use efficiency of mustard in Bhandara district with the specific objectives to estimate the cost and returns of mustard and to analyze the resource use efficiency of mustard.

Materials and Methods

The present study was undertaken in Bhandara district of Vidarbha region for the year 2023-24. For the present study, multistage random sampling was used. In the first stage Bhandara district of Vidarbha region was selected purposively. In the second stage, two tehsils were selected on the basis of potential area under mustard cultivation. i.e. Sakoli and Mohadi. From Sakoli tehsil Sonegaon, Usgaon and Chanduri villages were selected, and from Mohadi tehsil Belgaon and Khamari villages were selected. From each village random numbers of farmers were selected. Total 100 farmers were selected. The required data was collected by personal interview method by using a pre-tested scheduled. The collected data was tabulated and then a simple tabular analysis was carried out. To work out the cost and returns, standard cost concepts was used i.e. Cost 'A₁', 'A₂', 'B₁', 'B₂', 'C₁', 'C₂' and 'C₃'. To analyse the resource use efficiency Cobb Douglas production function was used.

Cobb-Douglas production function

The Cobb-Douglas of production function was used to specify as follows,

$$Y = ax_1^{b_1} \times x_2^{b_2} \times x_3^{b_3} \times x_4^{b_4} \times x_5^{b_5} \times x_6^{b_6} \times x_7^{b_7}$$

Where,

Y = Yield in quintals per hectare

a = Intercept

b₁, b₂, b₃, b₄, b₅, b₆, b₇ = Partial Regression Coefficient of respective factor as follows.

X₁ = Human labour in Rs/ha.

X₂ = Seed in kg/ha

X₃ = Machinery in Rs/ha.

X₄ = Manure in Rs/ha.

X₅ = Nitrogen in Rs/ha.

X₆ = Phosphorous in Rs/ha.

X₇ = Plant protection in Rs/ha.

Marginal productivity of the resources (MVP)

Marginal productivity of the resources (MVP) from the above production function M.V.P of each resources were worked out. The marginal productivity or particular input "X_i" at geometric mean of input and output expressed in following equation

$$MVP = b_1 \frac{GM(Y_i)}{GM(X_i)} p_{xi}$$

Where,

b₁ = Elasticity of output with respect to X_i

GM (Y_i) = Geometric mean of output Y_i

GM (X_i) = Geometric mean of input X_i

P_{xi} = Price of X_i

Results and Discussion

Per hectare cost of cultivation of Mustard

The cost has been determined based on standard cost concepts i.e. cost 'A₁', cost 'A₂', cost 'B₁', cost 'B₂', cost 'C₁', cost 'C₂' and cost 'C₃'. The different cost concepts have different utilities in research. Here an attempt has been made to estimate the figures of the cost of mustard crop in the study area and represented as follows,

Table 1: Per hectare cost of cultivation of Mustard

Sr. No.	Particulars		Unit/ha	Input	Cost Per input (Rs.)	Total cost (Rs.)	Percentage to total cost
1.	Hired Human Labour	Male	Days	12.87	296.10	3810.82	11.86
		Female	Days	12.06	149.12	1798.39	5.60
2.	Machine Charges	Hired	Hours	5.60	843.61	4724.26	14.70
3.	Seed	Cost	Kg/Rs.	2.47	114	281.58	0.88
4.	Irrigation charges	Cost	Rs.			2352.34	7.32
5.	Manures		Qtl.	25.91	110	2850.10	8.87
6.	Fertilizers	N	Kg.	49.33	5.34	263.42	0.82
		P	Kg.	39.60	7.24	286.70	0.89
		K	Kg.	0.00	0.00	0.00	0.00
7.	Plant Protection	Cost	Rs.			143.54	0.45
8.	Incidental charges	Cost	Rs.			105.64	0.33
9.	Repairing charges	Cost	Rs.			196.53	0.61
10.	Working capital (1 to 9)	Cost	Rs.			16813.27	52.32
11.	Int. on working capital @ 6%	Cost	Rs.			504.40	1.57
12.	Depreciation		Rs.			279.06	0.87
13.	Land Rev. cess & other taxes		Rs.			55.59	0.17
14.	COST A ₁ (10 to 13)		Rs.			17652.31	54.93
15.	Rent paid for leased land		Rs.			0.00	0.00
16.	COST A ₂ (14 to 15)		Rs.			17652.31	54.93
17.	Int. on Fix. Cap. @ 10 %/annum		Rs.			653.34	2.03
18.	COST B ₁ (16 to 17)		Rs.			18305.65	56.97
19.	Rental value of land		Rs.			6625.32	20.62
20.	COST B ₂ (18 to 19)		Rs.			24930.97	77.58
21.	Family Human Labour	Male	Days	14.46	296.10	4281.61	13.32
22.	COST C ₁ (18 + 21)		Rs.			22587.26	70.29
23.	COST C ₂ (20+21)					29212.58	90.91
24.	10 % of Cost C ₂					2921.26	9.09
25.	COST C ₃ (23+24)					32133.83	100
26.	Yield Per hectare	Produce	Qtls	7.37	5439.00	40085.43	
27.	Value of Total Produce		Rs.	7.37	5539.00	40085.43	
28.	Per qtl. Cost of main produce at Cost C ₃		Rs.			4360.09	

Table 1. revealed that per hectare, the cost of cultivation at cost 'A₁' and cost 'A₂' was Rs. 17652.31, cost 'B₁' 18305.65 and cost 'B₂' is Rs. 24930.97, cost 'C₁' is Rs. 22587.26, cost 'C₂' is Rs.

29212.58 and cost 'C₃' is Rs. 32133.83 which indicates the 10 per cent as a managerial cost. (Similar results were reported by Sonvane *et al.*, 2016) [7] The major share of the cost of

cultivation goes towards cost 'A₁' and cost 'A₂' (54.93 per cent). In costs 'A₁' and 'A₂', the major share was of hired human labour i.e. (17.46 per cent) followed by machine charges (14.70 per cent), manure (8.87 per cent), irrigation charges (7.32 per cent), fertilizers (1.71 per cent), seed (0.88 per cent) and plant protection charges (0.45 per cent). All the above inputs are cash inputs for which farmers are required to pay immediately from their pocket. Cost 'B₁' contributes (56.97 per cent), and cost 'B₂' contributes (77.58 per cent) to the total cost i.e. cost 'C₃'. The share of family labour was 13.32 per cent. Per hectare yield

obtained by farmers was 7.37 quintal with a gross return of Rs.40085.43.

Per hectare cost and returns of Mustard cultivation

The cost and returns structure per hectare of agricultural production helps the farmer in mapping adjustments in the organization and thereby secure the optimum level of production and income. Per hectare cost and returns of the Mustard were worked out for farmers were presented in Table 2.

Table 2: Per hectare cost and returns from Mustard cultivation (Rs/ha)

Sr. No.	Particulars	Total
1.	Yield (qtl./ha)	7.37
2.	Price/qtl.	5439.00
3.	Gross value of produce	40085.43
4.	Cost of Cultivation at	
a)	Cost 'A ₁ '	17652.31
b)	Cost 'A ₂ '	17652.31
c)	Cost 'B ₁ '	18305.65
d)	Cost 'B ₂ '	24930.97
e)	Cost 'C ₁ '	22587.26
f)	Cost 'C ₂ '	29212.58
g)	Cost 'C ₃ '	32133.83
5.	Net return at	
a)	Cost 'A ₁ '	22433.12
b)	Cost 'A ₂ '	22433.12
c)	Cost 'B ₁ '	21779.78
d)	Cost 'B ₂ '	15154.46
e)	Cost 'C ₁ '	29212.58
f)	Cost 'C ₂ '	10872.85
g)	Cost 'C ₃ '	7951.60
6.	Input-output ratio at	
a)	Cost 'A ₁ '	2.27
b)	Cost 'A ₂ '	2.27
c)	Cost 'B ₁ '	2.18
d)	Cost 'B ₂ '	1.60
e)	Cost 'C ₁ '	1.77
f)	Cost 'C ₂ '	1.37
g)	Cost 'C ₃ '	1.24

Table 2. Revealed that on average gross returns worked out to Rs. 40085.43. The net returns obtained at various costs were Rs. 22433.12 at cost 'A₁' and costs 'A₂', Rs. 21779.78 at cost 'B₁', Rs.15154.46 at cost 'B₂', Rs. 29212.58 at cost 'C₁', Rs. 10872.85 at cost 'C₂' and Rs.7951.60 at cost 'C₃'. This means the mustard crop appeared to be good for monetary benefits. The input-output ratio at cost C₃ was 1:1.24. (Similar results were reported by Sonvane *et al.*, 2016) [7] This indicates that one rupee invested in the cultivation of mustard earned Rs. 1.24. The good

input-output ratio indicates that mustard cultivation is profitable.

Resource use efficiency in Mustard production

The resource use efficiency of mustard production was worked out by using Cobb Douglas production function. Seven independent variables (resources) were considered for analysis of the resource use efficiency namely Human labour (X₁), Machinery (X₂), Seed (X₃), Manures (X₄), Nitrogen (X₅), Phosphorous (X₆), Plant protection (X₇).

Table 3: The results of Cobb-Douglas production function for mustard

Sr. No.	Variable	Regression coefficient	Standard error	MVP
1.	Constant (Intercept)	5.814	0.078	
2.	Coefficient			
a.	Human labour (X ₁)	-0.074	0.056	-0.558
b.	Machinery (X ₂)	-0.082	0.051	-0.723
c.	Seed (X ₃)	0.191	0.410	2.888
d.	Manures (X ₄)	-0.044**	0.022	-0.685
e.	Nitrogen (X ₅)	0.119	0.110	19.006
f.	Phosphorous (X ₆)	1.017**	0.043	150.136
g.	Plant protection (X ₇)	0.973***	0.015	286.69
3.	Coefficient of Determination (R ²)	0.828		

(***, **, * indicate 1 per cent, 5 per cent, and 10 per cent level of significance.)

It is revealed from the Table 3. that in Cobb-Douglas production function R^2 value for the production was observed to be 0.828 which indicates that the function was good to fit and able to explain the independent variable to an extent of 82 per cent. The regression coefficient of plant protection was 0.973 and phosphorous 1.017 positively significant to gross income at 1 per cent and 5 per cent level of significance, respectively. The regression coefficient of manure was (-0.044) negatively significant to gross income at 5 per cent level of significance. Other remaining variables were found non-significant. In the Cobb-Douglas production function, the regression coefficient directly shows the production function elasticity hence, human labour, machinery, seed, and nitrogen, could not influence on mustard production significantly. The marginal value productivity of resources and their ratio to their respective prices was observed and found that the factors seed was 2.888, nitrogen was 19.006, phosphorous was 150.136 and plant protection was 286.69 were positive which indicate underutilization of resources whereas of human labour was -0.558, machinery charges was -0.723, and manure was -0.685 was negative i.e. less than one. This indicates over utilization of these resources. Hence, there should be reduction in utilization of these resources to optimize mustard returns.

Conclusion

The study confirms that mustard cultivation is profitable. This conclusion is supported by the positive net returns of Rs/ha 7951.60 at cost 'C₃', the good input-output ratio of 1.24 indicates economic efficiency of the crop. The ratio reflects a favourable return on investment, suggesting effective resource utilization and economic viability. The value of R^2 for the Cobb-Douglas production function was observed to be 0.828. The value of regression coefficient of plant protection was 0.973 and for phosphorous was 1.017 were positively significant to gross income at 1 per cent and 5 per cent level of significance respectively. while the value of manure -0.044 was negatively significant to gross income at 5 per cent level of significance. Marginal value of productivity of resources and their ratio to their respective price was observed and found that the factor human labour, machinery, and manures were overutilized in the study area, whereas seed, nitrogen, phosphorous and plant protection were found underutilization and leaving scope for their increase use.

References

1. Ahmad R, Verma RR, Sengar VS, Singh KK, Kumar N, Singh RA, *et al.* Mustard: Economic study on resource use efficiency analysis in Lakhimpur Kheri district of Uttar Pradesh. *J Pharmacogn Phytochem.* 2018;7(6):623-625.
2. Bhagat G, Singh SP, Dwivedi S, Bhat A, Raj L, Sharma S, *et al.* Profitability and resource use efficiency of mustard in Jammu district of J&K (UT). *Agro Economist.* 2022;9(1):107-110.
3. Kumar P, Singh KK, Singh R, Singh SP, Singh YP. An economic analysis of production and marketing in rapeseed mustard crop in Meerut district of western Uttar Pradesh. *Int J Curr Microbiol Appl Sci.* 2017;6(9):703-709.
4. Kumar R, Gupta JK, Gurjar NS, Bhadouria AKS, Rathor N. Analysis of resource use efficiency and constraints of mustard production in Bhind district of Madhya Pradesh. *J Pharmacogn Phytochem.* 2018;2:219-221.
5. Pawar N, Mehla V, Devi M, Malik DP, Sumit. Economic dimensions and resource use efficiency of mustard crop under sprinkler irrigation in Southern Haryana. *J*

6. Sharma S, Raghuwanshi JS, Srivastava SC. An economic analysis of costs and returns of rapeseed and mustard production in Morena district of Madhya Pradesh. *J Community Mobilization Sustain Dev.* 2018;3(3):475-482.
7. Sonvane OP, Pathak H. An economic analysis of production and marketing rapeseed-mustard crop in Bastar plateau of Chhattisgarh, India. *Plant Arch.* 2016;16(1):37-44.
8. Rathour S, Kumari M, Kumar S, Panda CK, Nahakpam S, Behera SK. Economics of rapeseed-mustard production in Begusarai district of Bihar. *Econ Aff.* 2022;67(01):25-29.