



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(7): 1356-1359
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www.thepharmajournal.com
Received: 28-04-2023
Accepted: 29-05-2023

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An economic analysis and constraints of mustard production in gird agro-climatic region of Madhya Pradesh

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Abstract

The Madhya Pradesh occupies the second position in the mustard area in India. The highest area under mustard was found to be occupied by Gird agro-climatic region. Bhind district was selected on the basis of the maximum area of Mustard. The cost C_3 of cultivation was found to be a maximum ₹ 65457.82 ha⁻¹ in large size of farms followed by medium (₹ 59950.21 ha⁻¹) and small (₹ 55861.53 ha⁻¹) size of farms in cultivation of mustard. An average farmer was also found to be received ₹ 4608.18/ha from sold by products. Thus, an average farmer was found to be a gross return obtained ₹ 100793.43/ha from the cultivation of mustard. He was found to be real income obtained ₹ 41986.66/ha. His family labour, farm business and farm investment income were also calculated and found to be ₹ 54769.36, 72198.77 and 59416.07 per hectare, respectively. This finding was found to be similar across the size of farms with minor variation. The technological constraints were found to be affected by mustard production in the study area, it may be enhancing the productivity of mustard if properly solved the constraints in the mustard production area.

Keywords: Cost, constraints, mustard, economic, production, profitability

Introduction

Rapeseed mustard belongs to the family Cruciferae and the genus Brassica. Rapeseed (*Brassica campestris*) commonly called Sarson or Toria is an herbaceous annual plant shorter than mustard (rai) between 45-150 cm (Kumar *et al.*, 2017) [2]. It is mainly cultivated in the tropical and subtropical areas of the world. The importance and potential of the rapeseed-mustard crop are well known as it is the key oilseed crop that can help in addressing the challenge demand-supply gap of edible oil in India. India is the third largest producer of rapeseed-mustard after Canada, China and contributes to around 11% of the world's total production (Bareliya, 2023) [1]. The mustard was found to be cultivated in the 6699.67-thousand-hectare area in the country during the year, 2021-22. The highest area under mustard was found to be occupied by Rajasthan (40.55%) followed by Madhya Pradesh (11.18%), Uttar Pradesh (10.46%), Haryana (9.66%), West Bengal (8.85%) and other states (19.29%) mustard area of top five state in study year 2021-22. The Madhya Pradesh occupy second position in mustard area in India (dacnet, 2021-22). The highest area under mustard was found to be occupied by Gird agro-climatic region (73.87%) followed by the Northern hill region of Chhattisgarh (7.87%), Kymore Plateau & Satpura Hills (7.34%), Bundelkhand (6.14%), Malwa Plateau (3.05%) and others Agro-climatic region (1.73%) mustard area of top five regions of Madhya Pradesh in the study year 2021-22.

The mustard was found to be cultivated in a 675.079 -thousand-hectare area and the total mustard production was found to be 1038.35 thousand tonnes, in Madhya Pradesh during the year 2021-22. The Bhind district (42.79%) occupies maximum area followed by Morena (29.71%), Gwalior (9.34%), Sheopur (7.87%), Shivpuri (6.32%), Ashok Nagar (2.18%) and Guna (1.78%) in the study year 2021-22 (dacnet, 2021-22).

The per hectare costs incurred on the various input factor in the production of mustard was worked out. the total costs of cultivation. The cost of cultivation of mustard crops, reflects a positive relationship with size group of farms, as it was increases with an increase in holding size of sample farms (Sahu *et al.*, 2018) [4]. The total profitability of rapeseed-mustard cultivation was much more remunerative because of input cost technology.

When we consider only variable cost then profitability from rapeseed-mustard crop was more attractive. The variable cost per quintal was positively related to the size of holdings, while other costs which include fixed cost, were directly related to the size of holdings.

In case of technical constraints, 93.33 percent of farmers were facing problem of lack of training in scientific mustard production technology. While among the economic constraints high cost of seed, fertilizers, insecticides and implements is perceived by most of the farmers (90.83%). Garrett's ranking technique was used to organize the farmer's responses to constraints of crop production and marketing. Garrett's ranking technique provides the changes of orders of constraints and advantages into numerical scores (Vahora *et al.*, 2023) [5]. Keeping all these matters in mind the present study has been carried out to economic analysis and constraints of Mustard Production in the Gird Agro-Climatic Region of Madhya Pradesh.

Methods and Materials

The Gird agro-Climatic Region of Madhya Pradesh has been taken into consideration for the study. The Gird agro-climatic region comprises seven districts namely Sheopur, Morena, Bhind, Gwalior, Shivpuri, Guna and Ashoknagar. Out of seven districts, Bhind district was selected on the basis of the maximum area of Mustard. There are six blocks/tehsil in Bhind district namely Bhind, Ater, Mehgaon, Gouhad, Roun, and Lahar, out of which four blocks were selected having a maximum area under mustard. A list of all the villages in each block was prepared and one village was selected randomly for the study. Further, a list of all the mustard growers with their size of farms were prepared and classified into small (< 2 ha), medium (2-5 ha) and large (> 5ha) categories and 10% of mustard growers were selected through multistage stratified proportionate percentage random sampling method for the study. Therefore 121, 79 and 40 mustard growers were selected from small, medium and large categories for the study. Constituting total size of sample was 240 Mustard growers from 4 villages, and 4 blocks of Bhind district in the Gird Agro-climatic Region of Madhya Pradesh.

The present data were collected through personal interaction by pretested interview schedule and hence to the study year 2021-22. Tabulation and analysis of data were carried out to draw conclusions. The cost concept of mustard was analysed through the following equations.

The cost concepts approach to farm costing is widely used in India. To work out the cost of cultivation standard method of cost of cultivation employed by the Commission on Agricultural Costs and Price (CACP), Directorate of Economics and Statistics, Government of India was adopted which includes Cost A₁, Cost A₂, Cost B₁, Cost B₂, Cost C₁, Cost C₂ and Cost C₃.

Measures of profit: For the estimation of profitability from mustard, the following income measures were used in this study.

- a) Gross income = Market price per quintal X Total Production.
- b) Net farm income (NFI) = Gross income - cost C₃ (total cost).
- c) Farm investment income = Net farm income + interest on fixed capital + rental value of owned land
- d) Family labour income (FLI) = Gross income - cost B₂
- e) Farm business income (FBI) = Gross income - cost A₁

- f) Cost of production = Total cost/Total production
- g) Return per rupee = Gross income/cost C₃ (total cost)

The Garrets ranking technique provides the changes of orders of constraints and advantages into numerical scores. The prime advantage of this technique over simple frequency distribution is that the constraints are arranged based on their severity from the point of view of the respondent hence, the same number of respondents on two or more constraints may have been given different ranks. Garrett's formula for converting rank into a percent is that,

$$Percent\ position = 100 \times \frac{(R_{ij} - 0.05)}{N_j}$$

Where,

R_{ij} = Rank given for ith constraints by jth individual

N_j = Number of constraints ranked by jth individual

Results and Discussions

Cost of cultivation based on cost concept Cost A₁-C₃ according to CACP in the cultivation of Mustard was estimated and presented in Table 1. Overall an average farmer was found to be invested ₹ 28594.66 per hectare as cost A₁/A₂. Average expenditure on Cost B₁, Cost B₂, Cost C₁, Cost C₂, and Cost C₃ were found to be respectively ₹ 29225.16, 46024.07, 36661.79, 53460.70, and 58806.77 in a hectare of land in cultivation of mustard. The cost A₁ of cultivation was found to be maximum ₹ 33792.82 ha⁻¹ in large size of the farm followed by medium (₹ 29725.88 ha⁻¹) and small (₹ 26137.69 ha⁻¹) size of farms in the cultivation of mustard. Cost B₁, Cost B₂, Cost C₁, and Cost C₂ were found to be similar to cost A₁/across the size of farms with minor variation. The cost C₃ of cultivation was found to be maximum ₹ 65457.82 ha⁻¹ in large size of farms followed by medium (₹ 59950.21 ha⁻¹) and small (₹ 55861.53 ha⁻¹) size of farms in the cultivation of mustard.

Table 1: Cost of cultivation of mustard according to concept Cost A₁-C₃ across the size of farms (₹ ha⁻¹)

Particulars	Small	Medium	Large	Overall
Cost A ₁	26137.69	29725.88	33792.82	28594.66
Cost A ₂	26137.69	29725.88	33792.82	28594.66
Cost B ₁	26759.66	30361.93	34438.20	29225.16
Cost B ₂	43108.21	47240.81	52441.48	46024.07
Cost C ₁	34434.66	37621.31	41503.83	36661.79
Cost C ₂	50783.21	54500.19	59507.11	53460.70
Cost C ₃	55861.53	59950.21	65457.82	58806.77

Source: field survey data

There were found to be increasing the land holding the same ratio increasing the cost of cultivation the total cost ₹ 55861.53, 59950.21, and 65457.82, small, medium, and large per hectare of mustard production across the size of farms respectively (Table 1).

Profitability of mustard

Profitability of mustard was calculated on the yield of the crop and gross, net farm, family labour, farm business, and farm investment income have been analysed for the study. The cost of production and return on investment of ₹ 1.00 was also analysed for mustard cultivation.

Yield and return

At overall level an average farmer was found to be produce 14.12 q ha⁻¹ in the cultivation of mustard which was sold in the market at ₹ 6809.65/q and return from the main product was found to be obtained ₹ 96185.24/ha in the cultivation of mustard. An average farmer was also found to be received ₹ 4608.18/ha from sold by products. Thus, an average farmer was found to be a gross return obtained ₹ 100793.43/ha from the cultivation of mustard. He was found to be real income obtained ₹ 41986.66/ha. His family labour, farm business and farm investment income were also calculated and found to be

₹ 54769.36, 72198.77 and 59416.07 per hectare, respectively. This finding was found to be similar across the size of farms with minor variation.

As for the size of farm increase yield was found to be increased from 13.87 (small) to 14.93q/ha (large) in the cultivation of mustard and an average farmer also had gross income increased with the size of farms from ₹ 98091.30 and 108019.70/ha from the cultivation of mustard. Net, Farm investment, Farm business, and Family labour income were also found to be similar increases with the size of farms.

Table 2: Profitability of Mustard production across the size of farms (₹)

Particulars	Small	Medium	Large	Overall
Production (q/ha)	13.87	14.10	14.93	14.12
Price of main product (₹/q)	6760.00	6845.00	6890.00	6809.65
value of main product	93761.20	96514.50	102867.70	96185.24
Quantity of by-product(q/ha)	20.14	21.15	22.40	20.85
Price of by product (₹/q)	215.00	225.00	230.00	220.79
value of by product	4330.10	4758.75	5152.00	4608.18
Gross Income	98091.30	101273.25	108019.70	100793.43
Total cost (Cost C ₃)	55861.53	59950.21	65457.82	58806.77
Net income	42229.77	41323.04	42561.88	41986.66
Family labour income	54983.09	54032.44	55578.22	54769.36
Farm business income	71953.61	71547.37	74226.88	72198.77
Farm investment income	59200.29	58837.97	61210.54	59416.07

Source: Field survey data

The farmers were producing 14.12 q /ha of mustard which was sold in market at ₹ 6809.65/q and returns were found to be obtained ₹ 96185.24/ha in cultivation of mustard. It can be farmer was also found to be received ₹ 4608.18/ha from sold by products. Thus, farmers were found to be gross return obtained ₹ 100793.43/ha from cultivation of mustard. He was found to be real income obtained ₹ 41986.66/ha. His family labour, farm business and farm investment income were also calculated and found to be ₹ 54769.36, 72198.77 and

59416.07 per hectare, respectively (Table 2).

Constraints in enhanceive yield

The various constraints which were found to be faced by the selected mustard producers in enhancing yield of mustard area presented in table 3. It was observed from the data that due to various socio-economic and technological constraint across size of farms.

Table 3: Constraints in adoption of recommended packages of Mustard

Constraints	Garret Score	Ranking
Socio-Economics		
High price of insecticides/pesticides	71.72	1
High cost of certified seed	68.60	2
Non-availability of bullock labour and machine labour at sowing	66.79	3
Non-availability of human labour during intercultural operation	63.21	4
Use of undecomposed manure that which are produced weeds	51.04	5
Institutional source does not provide timely financial support	49.76	6
Financial dependency on non-institutional sources	47.92	7
Incomplete knowledge from Neighbor farmers	47.62	8
Farmers dependency on local seeds of mustard	47.57	9
farmers dependent on related and neighbor farmers for crop selection	43.68	10
Technological		
No forecast of unfavorable weather condition	68.71	1
unaware from PSB use and their importance of crop	67.26	2
unaware of integrated pest management	66.98	3
Plant disease and their treatment	63.29	4
Unaware of dose of insecticides/ pesticides	51.92	5
Plant to plant and row to row distance	50.19	6
Lack of knowledge about seed depth	49.15	7
Recommended varieties of mustard	48.64	8
Seed treatment and its procedure	48.05	9
Recommended seed rate	43.71	10

Source: Field survey data

The socio-economic constraints play a major role in mustard production. The majority of mustard growers reported that

high price of insecticides /pesticides (71.72%), certified seed (68.60%), Non-availability of labour and machine labour at

sowing (66.79%), Non-availability of human labour during intercultural operation (63.21%), Use of undecomposed manure that which was produce weeds (51.04%), Institutional source not provide timely financial support(49.76%), Financial dependency on non-institutional source(47.92%), incomplete knowledge from Neighbor farmers(47.62%), Farmers dependency on local seeds of mustard (47.57%) and farmers dependent on related & neighbor farmers for crop selection (43.68%).

The technological constraints were found to be affected of mustard production in study area these were no any forecast of unfavorable weather condition (68.71%) followed by unaware from PSB use and their importance of crop (67.26%), unaware about integrated pest management (66.98%), Plant disease and their treatment (63.29%), Unaware about dose of insecticides/ pesticides (51.92%), Plant to plant and row to row distance (50.19%), lack of knowledge about seed depth (49.15%), recommended varieties of mustard (48.64%), Seed treatment and its procedure (48.05%) and Recommended seed rate (43.71%). These constraints were found to be similar across size of farms in different categories of producers with minor variance (Table 3).

Hence, it can be concluded that the cost A₁ of cultivation was found to be maximum ₹ 33792.82 ha⁻¹ in large size of farm followed by medium (₹ 29725.88 ha⁻¹) and small (₹ 26137.69 ha⁻¹) size of farms in cultivation of mustard. Cost B₁, Cost B₂, Cost C₁, Cost C₂ were found to be similar like cost A₁/across size of farms with minor variation. Thus, an average farmer was found to be gross return obtained ₹ 100793.43/ha from cultivation of mustard. He was found to be real income obtained ₹ 41986.66/ha. His family labour, farm business and farm investment income were also calculated and found to be ₹ 54769.36, 72198.77 and 59416.07 per hectare, respectively in the area under study. Socio-economic constraints play a major role in mustard production. The technological constraints were found to be affected by mustard production in the study area, it may be enhancing the productivity of mustard if properly solved the constraints in the mustard production area.

Therefore, it can be suggested that efforts should be made to transfer recommended package of practices, credit facility at a low-interest rate, reduced the input prices (fertilizers and plant protection chemicals, etc.) by the government, availability of human & machine labours in farmer's field with good quality high yielding & latest variety of mustard. the wages of labours should be paid in a timely by farmers. Demonstration of newly released variety of mustard should be demonstrated in farmers' fields.

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