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An economics analysis of production and marketing of mustard in Sri Ganganagar, Rajasthan

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Abstract
The present study was conducted to estimate the costs and returns structure in the production of mustard, to identify the marketing channels, to analyze the price spread in the marketing of mustard and to identify the constraints in the production and marketing of mustard in Sri Ganganagar district of Rajasthan during 2021-22. Primary data were collected from 80 farmers comprised of 27 small, 47 medium and 6 large farmers from four villages of Anupgarh and Raisinghnagar blocks of Sri Ganganagar district. To study the marketing aspects data were collected from various intermediaries in Gharsana and Jaitsar markets of Sriganganagar district. The results revealed that the average size of operational holding in case of small, medium and large farmers was 3.99, 11.85 and 29.50 acres, respectively. The area under mustard on the said categories of farms was 0.94, 2.97 and 7.65 acres, respectively. The total fixed costs per acre were estimated to be Rs. 7277.90, Rs. 7312.94 and Rs. 4974.27 while per acre total variable costs came out to be Rs. 7612.87, Rs. 7311.01 and Rs. 7138.11, respectively on the small, medium and large farms. The returns over variable costs were found highest on large farms (Rs. 15545.05) as compared to medium (Rs. 12951.18) and small (Rs. 11908.51) farms. Total cost per quintal of output was estimated to be the lowest on the large farms which might be due to operation of economies of scale. The percent profit margin was estimated to be 23.72, 27.82 and 46.60 percent on small, medium and large farms, respectively. The results of productivity analysis showed that at overall level the actual yield was found less than the yield of ARS recommended variety (RGN-298) by 3.50 quintal per acre. This gap could be narrowed down by making available better quality farm inputs, pesticides and insecticides, weed control and disease management. The marketed surplus on large farms came out to be 95.09 percent followed by small (90.53%) and medium (89.67%) farms. The price spread in Jaitsar market (Rs. 8008.90) was found to be more than Gharsana market (Rs. 7953.90) in Channel-I (Producer-Processor-Oil Wholesalers-Oil Retailers-Consumers). Producers share in consumer rupee in channel-II was found more as compared to both the markets in channel I as none of intermediaries were involved in this channel. High cost of inputs, shortage of labour, non-availability of quality inputs particularly plant protection chemicals, production and price risks, incidence of pests and diseases, lack of suitable varieties, exploitation by middlemen and lack of processing facilities were important production and marketing constraints and overcoming these constraints is critical for improving production and productivity of rapeseed and mustard in the district. Major avenues for future increase in mustard production are expected to come from enhancement in productivity of this crop. A combination of high yielding varieties and hybrids and efficient crop management needs to be adopted.

Keywords: Mustard, costs, marketing efficiency, marketed surplus, profit margin, productivity, returns

Introduction
India is the fourth largest contributor of oilseeds in the world after the USA, China and Brazil and rapeseed and Mustard contributes about 28.6% of total oilseed production. India has diverse agro-ecological conditions which are favorable for 9 annual oilseed crops. Rajasthan is the top mustard producing state of India, followed by Haryana and MP. Almost half (48.12%) of Rapeseed and Mustard is produced by only Rajasthan. In Rajasthan, the mustard crop is mostly cultivated in Alwar, Sriganganagar, Bharatpur, Tonk, Sawai Madhopur districts. (www.agritech. 2020.com).

Mustard belongs to the family Cruciferae and genus *Brassica*. A Mustard plant is an annual herb and usually about 45-150 cm high. The crop takes 135 to 150 days to mature. The cultivation of brown sarson, which once dominated the entire rapeseed- mustard growing region, is now shadowed by Indian mustard. Indian mustard, brown and yellow sarson, raya and toria crops are included in mustard rapeseed groups. (Dhakre and Sharma, 2010) [12].

Mustard group of crops is one of the major oilseed crops of India. India holds a premier position in rapeseed-mustard economy of the world with 2nd and 3rd rank in area and production, respectively.

This group of oilseed crops is gaining wide acceptance among the farmers because of adaptability for both irrigated as well as rainfed areas and suitability for sole as well as mixed cropping. Besides, it offers higher return with low cost of production and low water requirement (Das and Sharma, 2012) [13].

Being a major Rabi (winter season) oilseed crop and having an advantage of soil moisture conserved during monsoon; it has greater potential to increase the availability of edible oil from the domestic production. Mustard cultivation therefore is a profitable venture. The low maintenance mustard crop can to a large extent fulfill the journey of the country in becoming self- sufficient in edible oils (Yadav *et al*., 2017) [14].

Material and Methods

The concepts used in the estimation of fixed costs, variable costs, total costs, gross returns, net returns, producer's share in consumer price, price spread, marketing margins and marketing efficiency are discussed below:

Fixed costs

These included (i) Depreciation on value of fixed assets: Depreciation is a charge on the amount of loss in the value of capital asset due to age and wear and tear resulting for their use. Depreciation in an accounting year, therefore, becomes a cost and is included in the fixed costs. It was calculated by straight line method by deducting junk value from original value and then dividing by number of useful years of assets under study. (ii) Land rent: It was taken as Rs. 30,000 per acre being the modal rate in sample villages during the study period (2021-22). (iii) Interest on capital investment: It was taken as 10% per annum on the investment incurred on machinery, equipment, etc.

Variable costs

The sum total of costs incurred on seeds, fertilizers, plant protection chemicals, human labour, machinery/ tractor hours and interest on working capital for half of the period covered under rapeseed and mustard constitute total variable costs.

Interest on working capital

Interest on working capital was computed at the rate of 7 percent per annum for half of the period covered under rapeseed and mustard.

Total costs

It is the sum of variable and fixed costs.

Gross returns

Gross returns were worked out by multiplying the total output and the average price received by the farmers.

Net returns

Net returns were calculated by deducting the total costs from gross returns.

Marketed surplus

It is the quantity which the producer actually sells is respective of his needs for home consumption and other requirements.

Marketing concepts

Marketing channels

These refer to the chains of intermediaries through which mustard pass on from the producer to ultimate consumers.

Producer's share in consumer rupee

It is the price received by the farmer expressed as a percent of the retail price (price paid by the consumer). The producer's share in consumer's rupee may be expressed as follows:

$$P_s = (P_f \div P_r) \times 100 \quad \text{.....(eq. 1)}$$

Where,
Ps = Producer's share in consumer's rupee
Pf = Producer's price
Pr = Retail price

Price spread

The price spreads of mustard in the sample market were investigated at a point of time in various marketing channels. The price spread refers to the difference between the price paid by the consumer and the price received by the producer for an equivalent quantity of farm produce at a given point of time in a specific market.

Price spread = Total marketing cost + Total Marketing margin .....(eq. 2)

Marketing margins

Marketing margin is the difference between the total payment (cost + purchase price)and receipt (sale price) of the middlemen.

$$A_{mi} = P_{ri} - (P_{pi} + C_{mi}) \quad \text{....(eq. 3)}$$

Where,
Ami = Absolute margin of i^{th} middleman
Pri = Total value of receipts per unit (sale price)
Ppi = Purchase value of goods per unit (purchase price)
Cmi = Cost incurred on marketing per unit

Marketing efficiency

Marketing efficiency was calculated by using Acharya's index of marketing.
Acharya's equation is

$$ME = FP / (MC+MM) \quad \text{..... (eq.4)}$$

Where,
ME = Marketing efficiency
FP = Price received by the farmer
MC = Total marketing cost
MM = Net marketing margins

Analysis of data

Consistent with the objectives of the study, different techniques were used for the analysis of data.

Tabular analysis

For the interpretation and comparison of costs and returns from rapeseed and mustard, marketed surplus on different sizes of farmers and to generate information on other parameters, tabular analysis was carried out.

Garrett's Ranking Technique

Garrett's Ranking Technique was used to rank the problems perceived by the sampled respondents. The degree of

response with regard to problems faced by sampled respondents was ranked. The most prevalent problem was given 1st rank and accordingly the next important problem was ranked on the basis of the severity of the problem.

$$\text{Percent position} = \frac{100\ (R_{ij} - 0.50)}{N_j}$$

Where,
R_{ij} = Rank given for i^{th} items/problems by the J^{th} respondent
N_j = Number of items/problems ranked by the J^{th} respondent
The relative position of each rank is converted into scores by referring the table given by Garrett and Woodworth (1969). Then for each factor problem, the scores of individual respondents were added together and mean score was calculated. The factor with highest mean score was considered to be the most important problem. The prime advantage of this technique over simple frequency distribution is that the problems are arranged based on their severity from the point of view of respondents.

Fixed cost

As shown in Table the overall cost on depreciation of fixed assets was 12.61 percent of the total fixed cost. In case of small farmers the depreciation on fixed assets was higher as it was (19.93%) followed by medium (8.82%) and large (8.16%). The results further revealed that interest on fixed capital was higher in case of small farmers (32.37%) followed by medium farmers (13.21%) and large farms (10.75%).

Table 1: Fixed cost in production of mustard on different categories of farms in Sriganganagar district, Rajasthan, 2021-22

Sr. No	Particulars	Farm size categories			Overall
		Small	Medium	Large	
1.	Depreciation on fixed assets	1450.63 (19.93)	644.72 (8.82)	405.67 (8.16)	898.79 (12.61)
2.	Land rent	3471.06 (47.70)	5702.41 (77.97)	4033.73 (81.09)	4824.18 (69.70)
3.	Interest on fixed capital @ 10% per annum	2356.21 (32.37)	965.81 (13.21)	534.87 (10.75)	1402.75 (19.69)
	Total Fixed Cost	7277.90 (100.00)	7312.94 (100.00)	4974.27 (100.00)	7125.72 (100.00)

Total fixed cost was found to be higher in case of medium farms (Rs. 7312.94) as compared to small (Rs. 7277.90) and large (Rs. 4974.27) farms. Overall total fixed cost was to the tune of Rs. 7125.72 per acre.

Variable costs

Out of total variable cost expenditure on seeds was 1.23 percent of total variable cost. The cost incurred on seed was 1.05, 1.32 and 1.36 percent for small, medium and large farms respectively. In overall situation the expenditure on urea was 4.15 percent of the total variable costs. In case of DAP the cost incurred was 11.19 percent, 12.41 percent and 13.45 percent on small, medium and large respectively. Large farmers used more of casual labour on their farms. The cost on the use of family labour for small farmer was 25.73 percent followed by medium (25.59%) and large (18.64%) farmers and it was observed that small farmers used more of their family members to work on farms.

Table 2: Variable costs in production of Mustard on different categories of farms in Sriganganagar district, Rajasthan, 2021-22

Sr. No	Particulars	Farm size categories			Overall
		Small	Medium	Large	
1.	Seed	79.72 (1.05)	96.66 (1.32)	96.75 (1.36)	90.95 (1.23)
2.	**Fertilizers**				
i.	Urea	297.08 (3.90)	310.80 (4.25)	320.32 (4.49)	306.88 (4.15)
ii.	DAP	852.00 (11.19)	907.20 (12.41)	960.00 (13.45)	892.53 (12.06)
3.	Human labour	3617.40 (47.52)	3800.18 (51.98)	3832.60 (53.69)	3740.91 (50.55)
i.	Family	1958.50 (25.73)	1870.60 (25.59)	1330.30 (18.64)	1859.74 (25.13)
ii.	Casual	1380.60 (18.14)	1472.12 (20.14)	1609.20 (22.54)	1451.50 (19.62)
iii.	Permanent	278.30 (3.66)	457.46 (6.26)	893.10 (12.51)	429.67 (5.80)
4.	Machinery custom hiring	2381.11 (31.28)	1820.11 (24.90)	1545.00 (21.64)	1988.81 (26.88)
5.	Plant protection chemicals	254.63 (3.34)	250.32 (3.42)	260.67 (3.65)	252.55 (3.41)
6.	Interest on Variable cost @ 7% for half of period	130.93 (1.72)	125.74 (1.72)	122.77 (1.72)	127.27 (1.72)
	Total Variable Costs	7612.87 (100.00)	7311.01 (100.00)	7138.11 (100.00)	7399.90 (100.00)

Economics of Mustard

The perusal of Table 3 reveals that the price per quintal of produce received by small, medium and large farmers was Rs. 3814.81, Rs. 3800.38 and Rs. 3846.02, respectively. The large farmers got better price for their produce than medium and small ones because of their better bargaining power and good quality of produce. On an average, the returns over the variable cost were estimated to be Rs. 12794.02 while these were Rs. 11908.51, Rs. 12951.19 and Rs. 15545.05 for small, medium and large farms, respectively.

Table 3: Economics of Mustard production on different categories of farms in Sriganganagar district, Rajasthan, 2021-22

Sr. No	Particulars	Farm size categories			Overall
		Small	Medium	Large	
1.	**Main product**				
i.	Yield (qtls)	4.83	5.02	5.56	5.00
ii.	Sale price (Rs./qtl)	3814.81	3800.38	3846.02	3806.13
iii.	Returns (Rs.)	18425.53	19077.91	21383.87	19030.65
2.	**By product**				
i.	Yield (qtls)	4.98	5.30	5.63	5.22
ii.	Sale price (Rs./qtl)	220.05	223.45	230.78	222.85
iii.	Returns (Rs.)	1095.85	1184.29	1299.29	1163.27
3.	Gross returns	19521.38	20262.20	22683.16	20193.92
4.	Returns over variable costs	11908.51	12951.19	15545.05	12794.02
5.	Total cost (Rs.)	14890.77	14623.95	12112.38	14525.62
6.	Net returns (Rs.)	4630.61	5638.24	10570.78	5668.30
7.	Input- Output ratio	1.31	1.39	1.87	1.39

Comparative productivity analysis

The comparative productivity analysis was done for the rapeseed and mustard crop to ascertain the gap between (i). The actual yield of the sampled farmers and ARS recommended variety of mustard (RGN-298) (ii). Actual yield of the sampled farmers and state average yield (iii). Actual yield of the sampled farmers and average yield of Sriganganagar district. As presented in Table 4, at overall level, the gap ascertained between the actual yield of the sampled farmers and ARS recommended variety was of 3.50 quintal per acre while on small, medium and large farms it was estimated to be 3.67, 3.48 and 2.94 quintals per acre. Actual yield of the sampled farmers at overall level was found nearer to the state average yield. But on small farms, the actual yield was found less than the state average yield of rapeseed and mustard.

Table 4: Productivity of Mustard at various level

Sr. No	Particulars	Farm size categories			Overall
		Small	Medium	Large	
1	Yield of ARS recommended variety (RGN-298)	8.5	8.5	8.5	8.5
2	Average yield of state	5.1	5.1	5.1	5.1
3	Average yield of Sriganganagar district	5.36	5.36	5.36	5.36
4	Actual yield of the sampled farmers	4.83	5.02	5.56	5

Marketing of mustard

The marketing costs, margins and price spread in channel-I in two markets namely Gharsana and Jaitsar market of Sriganganagar district is presented in Table 5. Channel- I was the main channel of marketing of rapeseed and mustard in the study area. The net price received by the producer was Rs. 3746.10 per quintal in Gharsana market and Rs. 3641.10 in Jaitsar market. Costs incurred by the producer on transportation, cleaning and unloading were to the tune of Rs. 40.00, Rs. 8.90 and Rs. 5.00, respectively per quintal which was found almost the same in both the markets. The costs incurred by processors included commission fee and VAT which were at rate of 2.50 percent and 6.88 percent, respectively. Commission fee, VAT, processing charges was estimated at Rs. 95.00, Rs. 261.44 and Rs. 123.95 per quintal respectively in Gharsana market and Rs. 92.50, Rs. 254.56 and Rs. 133.00 respectively in Jaitsar market. The marketing cost borne by oil-wholesalers were transportation cost, packing charges, electricity and labour charges which were estimated to be Rs. 100, Rs. 300, Rs. 300 and Rs. 200, respectively in Gharsana market while these costs were Rs. 210, Rs. 300, Rs. 250 and Rs. 200 in Jaitsar market. Labour and packing charges were found to be same in both the markets. The electricity charges were found more in Gharsana market (Rs. 300) than that in Jaitsar market (Rs. 250).

Table 5: Marketing costs, Margins and Price spread of mustard in markets of Sriganganagar district, Rajasthan, 2021-22 Channel-I Producer-Processor-Oil wholesalers-Oil retailers-Consumers

Sr. No	Particulars	Raman	Sanket
1.	Net price received by producer	3746.10	3641.10
2.	**Costs incurred by producer**		
i.	Transportation charges	40.00	45.00
ii.	Unloading charges	5.00	5.00
iii.	Cleaning charges	8.90	8.90
	Total marketing costs of producer	53.90	58.90
	Producer's sale price / Processor's purchase price	3800.00	3700.00
3.	**Costs incurred by Processor**		
i.	Transportation charges	9.00	10.95
ii.	Commission fee @ 2.5%	95.00	92.50
iii.	Cost of gunny bags	25.00	35.00
iv.	VAT @ 6.88%	261.44	254.56
v.	Stitching charges	2.48	2.48
vi.	Labour charges for loading	3.95	3.95

vii.	Labour charges for loading	10.00	10.00
viii.	Processing charges	123.95	133.00
	Total marketing costs of processor	530.82	542.44
	Processor's sale price /Oil-wholesaler's purchase Processor's margin	9000.00 4669.18	9000.00 4757.56
4.	**Costs incurred by oil-wholesalers**		
i.	Transportation cost	100.00	210.00
ii.	Packing cost	300.00	300.00
iii.	Electricity charges	300.00	250.00
iv.	Labour charges	200.00	250.00
	Total marketing costs of oil-wholesalers	900.00	960.00
	Oil-wholesaler's sale price / Oil-retailer's purchase price	10500.00	10600.00
	Wholesaler's margin	600.00	640.00
5.	**Costs incurred by oil-retailers**		
i.	Transportation cost	250.00	200.00
ii.	Labor cost	200.00	200.00
	Total marketing costs of oil-retailers	450.00	400.00
	Oil-retailer's sale price /Consumer's purchase price	11700.00	11650.00
	Retailer's margin	750.00	650.00
6.	Total marketing costs	1934.72	1961.34
7.	Total marketing margins	6019.18	6047.56
8.	Price spread	7953.90	8008.90
9	Producer's share in consumer's rupee (%)	32.02	31.25

Table 6: Producer's share in consumer's rupee of mustard in channel-II (Producer Consumer) in Sriganganagar district, Rajasthan, 2021-22

Sr. No	Particulars	Rs./qtl
1	Producer's sale price	3750
2	Consumer's purchase price	3750
3	Producer's share in consumer's rupee (%)	100

Some mustard growers sold a part of their produce directly to consumers on their farms. No marketing cost and transportation cost was incurred by the producer for such sales. It was evident from Table 6 that the producer's sale price or consumer's purchase price was Rs. 3750 in this channel. This was the most efficient channel of mustard market because the producer's share in consumer's rupee was 100 percent.

Marketing efficiency

The perusal of Table 7 revealed that the net price received by producers was more in Gharsana market (Rs. 3746.10) than Jaitsar market (Rs. 3641.10) channel-I and while it was Rs. 3750.00 in channel-II. In channel-I, the sum of marketing costs and margins was more in Jaitsar market because the margins of processors and oil-wholesalers was more in this market as compared to Gharsana market. The marketing efficiency of two markets came out to be 0.47 and 0.45 respectively which indicates in this channel Gharsana market was more efficient than Jaitsar market.

Jaitsar market because the margins of processors and oil-wholesalers were more in this market as compared to Gharsana market. The marketing efficiency of two markets came out to be 0.47 and 0.45 respectively which indicates in this channel Gharsana market was more efficient than Jaitsar market.

Table 7: Marketing efficiency in different marketing channels of mustard in Sriganganagar district, Rajasthan, 2021-22

Sr. No	Particulars	Channel - I		Channel-II
		Gharsana market	Jaitsar market	
1.	Net price received by producer	3746.10	3641.10	3750.00
2.	Marketing costs and margins	7953.90	8008.90	-
3.	Marketing efficiency	0.47	0.45	-

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