RESEARCH PAPER

An empirical analysis of marketing and value chain of mustard in Jhansi district of Uttar Pradesh

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Abstract : Mustard oil is consumed in India at one of the highest rates of any country in the world. Additionally, the growing agricultural sector contributes to the growing availability of high yielding mustard seeds, which in turn catalyses the production of mustard oil. This is because agriculture is expanding. This is a significant component of the economy of the entire world. In addition, the government of India has initiated a number of projects in an effort to raise the amount of oilseeds that are produced within the country. The study was purposively confined to Jhansi district of Uttar Pradesh. In the first stage, Jhansi district was selected purposively for study on the basis of having higher production and area under mustard crop. There are eight blocks in namely Babina, Badagaon, Bamaur, Bangra,Chirgaon, Gursrai, Mauranipur and Moth block was selected purposively on the basis of higher production of the mustard crop. Thus making a sample size of 120 in numbers. Total variable cost was found maximum in large farms Rs.33080.66 and least in marginal farms (Rs.26580), on all farms basis it was found Rs.30731. Variable cost was found to be a major contributor in total cost and it has been recorded increasing with increase in size of farms, the findings are also supported by the findings of Mathur 2011. Rental value of the owned land and rent paid for the land are found equal for all categories of farms *i.e.* Rs. 10000 and Rs. 34, respectively. Cost of depreciation was calculated maximum in large farms (Rs.485) and least was found in marginal farms (Rs.360). Interest on the fixed capital excluding land was calculated maximum in large farms (Rs.52.5) and least was found in marginal farms (Rs.48.5). In the same way total fixed cost was found maximum in large farms (Rs.10621.5) and least was found in marginal farms (Rs.10510.4), on all farms basis it was calculated Rs.10573. Total cost incurred per hectare *i.e.* cost of cultivation or Cost C3 was found maximum in large farms (Rs. 39562) and lowest in marginal farms (Rs. 36850), on all farms basis it was calculated Rs. 38646. In the case of Bundelkhand, the area under mustard has demonstrated a significant shift, increasing from 68575 hectares in 1997–1998 to 113392 hectares in 2019–20. Mustard production went from 25481 tonnes in 1997-1998 to 115892 tonnes in 2019-20, according to the observations that were made. The rising trend has a significant impact on the total amount of mustard that is produced in the Jhansi district. It has been observed that the maximum arrival of agricultural commodities in this mandi is dominated by the arrival of groundnut, followed by urd, and then wheat. As far as mustard is concerned, there are a total of 28 new arrivals between the months of March and June, and the typical filling pack size is 80 kilogrammes. During the time period in question, it was discovered that only ten separate journeys were undertaken. During the months of March through June, it was discovered that the supply of mustard reached its maximum number of trips of 500, and the standard filling pack size was 40 kg. In addition to this, it was discovered that the Jhansi mandi possesses effective management of its supply chain in terms of mustard.

Key Words : Mustard production, Marketing, Value chain, Efficiency

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India's principal economic engine is generally acknowledged to be its agricultural sector. India's agricultural industry continues to make up a less and smaller portion of the country's GDP, from 17% in 2013–14 to 49% in 2014, despite employing the most people in the economy and making up 49% of all workers there. The raw materials produced by the agricultural sectors are distributed to numerous significant industries, including jute, textiles, edible oils, tobacco, and sugar, among others. Edible oilseeds are significant players in Indian agriculture, accounting for more than 10% of the nation's total agricultural GDP. Soybeans, groundnuts, and rapeseed-mustard make up the three most significant oilseed crops farmed in India, accounting for a combined 80% of the nation's total production and 79% of its total area. Rapeseed-mustard was the source of 24.2% of the total oilseeds produced in the agricultural year 2012–2013. The establishment of new processing plants in or around mustard growing pockets in the district would sizably cut down transportation cost Kaur *et al*. (2018).

For this approach the present study was undertaken to study the socio-economic status of the farmer, input use pattern, cost and returns and resource use efficiency of mustard growers in Jhansi district. This study will be much helpful for the policy makers from government for the implementation of developmental schemes for mustard growers for doubling their income. With this background the present study has been undertaken with the following objectives to estimate the market efficiency and value chain of mustard and to calculate the cost and returns of mustard and finally to identify the constraints involved in marketing practices.

MATERIAL AND METHODS

The study was purposefully carried out at Jhansi district of Uttar Pradesh. There are 8 blocks namely Babina. Badagaon. Bamaur. Bangra.Chirgaon. Gursrai. Mauranipur and Moth. The present study was conducted to analyse the market efficiency, cost and returns, value chain of mustard. The intervention at different level in the marketing channels were also focused to find out the price spread and its margin for players like retailer wholesaler and secondary wholesaler to formulate the strategies for increasing and its existing market share in the unorganised retail market. Study area for research work was purposefully selected as required by the framed objectives. In order to acquire the necessary information, a suitable sampling is absolutely necessary. A multistage

sampling procedure was utilised for the selection of districts, blocks, villages, and farmers in the study area. Sample farmers were chosen using this method. In the first stage, Jhansi district was selected purposively for study on the basis of having higher production and area under mustard crop. There are eight blocks in namely Babina. Badagaon. Bamaur. Bangra.Chirgaon. Gursrai. Mauranipur and Moth block was selected purposively on the basis of higher production of the mustard crop. Another reason behind the selection was, it is the local area of investigator, and it was easier for him to develop empathy with respondents and collect data. One village from each block except Badagoan and Gursrai were selected randomly to make a sample of 60 farmer households and the list of villages were selected for the samples under traders' categories. Thus making the sample size of totally 120 in numbers.

RESULTS AND DISCUSSION

The Costs and returns of Mustard in the selected area is shown in the below table and also it shows the input use pattern per hectare of the crops grown by the different farms. Machinery cost was found highest in large farms (7.623) followed by semi medium farms (7.623), medium (5.854) small (4.532)and marginal (2.110), respectively. On all farms basis the machinery cost was found to be 10.293 in hours. Hired labour man days were found highest among large farms *i.e.* 137.992 followed by medium farms (74.312), semi medium farms (38.047) and lowest among marginal farms (15.690), on all farms basis, 111,048 man days were estimated. Family labour man days were found highest among medium farms *i.e.* 101.267 followed by large farms (101.011), small farms (89.246) and marginal farms (59.721), on all farms basis, 111.310 man days were recorded. It is due to the fact that large farmers have access to an abundance of resources, whereas marginal farms face a scarcity of resources, which is why the owners of those farms prefer to carry out the majority of the operations on their own. This trend can be seen in the employment of family members as opposed to hired labour. Seed requirement was found maximum in small farms *i.e.* 3.32 kg followed by medium farms 2.54 kg, small farms 1.73 kg and marginal farms 1.09 kg, on over all farms basis 7.00 kg seeds were involved in the cultivation. It has been observed that the use of seed is more prevalent on marginal and small farms as opposed to large and medium farms. The reason for this disparity is that large and

Table 1 : Input use pattern of mustard

Inputs	Marginal	Small	Medium	Large	All farms
Machine (hr)	2.110	4.532	5.854	7.623	10.293
Hired labour (hr)	15.690	38.047	74.312	137.992	111.048
Family labour (hr)	59.721	89.246	101.267	101.011	111.310
Seeds (kg)	1.094	1.730	2.540	3.320	7.000
Fertilizer N (kg)	13.026	21.394	34.236	40.492	53.200
Fertilizer P (kg)	7.267	11.035	22.967	26.833	48.629
Fertilizer K (kg)	0.091	0.516	0.538	0.6120	0.4392
Manures (qtl)	0.143	0.568	0.125	0.2564	0.2731
Irrigation recharges (kg)	736.730	1013.404	1014.008	1246.595	1961.137
Plant protection chemicals (Rs.)	10.000	13.636	16.234	21.256	45.184
Average size of crop area (ha)	0.18	0.31	0.47	0.61	0.90

medium farms tend to make use of hybrid seeds, whereas marginal and small farms make use of traditional seed applications. Nitrogen application was found maximum in large farms *i.e.* 40.49 kg followed by medium farms 22.96 kg, small farms 21.39 kg and marginal 13.02 kg, on over all farms basis nitrogen application was found 53.20 kg. None of the farm categories were found applying recommended dose of nitrogen *i.e.* 80 kg. Application of phosphorous was found highest among large farms (26.83 kg) followed by medium farms (27 kg), small farms (11.03) and marginal farms (7.26), respectively. On all farms basis the phosphorous was found 48.62 kg. The recommended dose of phosphorous, which is 40 kg, was not found to be being used by any of the farm categories, with the exception of large farms. Utilization of plant protection chemicals was found maximum in large farms (21.256) followed by medium farms (16.23), small farms (13.63) and lowest was found to be in marginal farms (10.00). Similar results were also observed by the study conducted by Meena *et al.,* 2018.

Table 3 shows the cost of cultivation of the mustard crop among various sample farms in Aurai block of Jhansi district of Bundelkhand region. Human labour cost was found highest in large farms (7800) followed by medium farms (Rs.6950), small farms (Rs.6100) and marginal farms (Rs.5230), respectively. On all farms basis the human labour cost was found Rs.6520. Machinery cost was found highest in large farms (Rs.7800) followed by medium farms (Rs.7520), small farms (Rs.6800) and marginal farms (Rs.5520), respectively. On all farms basis the machinery cost was found Rs.6910. Cost incurred on seed was found maximum in medium farms *i.e.* Rs. 680, followed by small farms (Rs.590), medium

farms (Rs.520) and large farms (Rs.500), on over all farms basis (Rs. 550) cost on seeds was incurred in the cultivation. Cost incurred on fertilizers was found maximum in large farms (Rs. 1850) and least in marginal farms (Rs. 1350), on all farms it was found Rs.1538.75. Cost incurred on Urea was found maximum among large farms *i.e.* Rs.700 and least among small farms (Rs.450), on all farms basis cost incurred on urea was found Rs. 587. Cost incurred on Phosphorous was found maximum among large farms *i.e.* Rs.1600 and least among marginal farms (Rs.1250), on all farms basis cost incurred on urea was found Rs. 1450. Cost incurred on Manure was found maximum among large farms *i.e.* Rs.2300 and least among medium farms (Rs.1350), on all farms basis cost incurred on urea was found Rs. 1625. In case of irrigation also cost incurred on irrigation was found maximum among medium farms *i.e.* Rs.4100 and least among marginal farms (Rs.3300), on all farms basis cost incurred on irrigation was found Rs. 3675. Total variable cost was found maximum in large farms *i.e.* Rs.33080.66 and least in marginal farms (Rs.26580), on all farms basis it was found Rs.30731. Variable cost was found to be a major contributor in total cost and it has been recorded increasing with increase in size of farms, the findings are also supported by the findings of Mathur 2011. Rental value of the owned land and rent paid for the land are found equal for all categories of farms *i.e.* Rs. 10000 and Rs. 34, respectively. Cost of depreciation was calculated maximum in large farms (Rs.485) and least was found in marginal farms (Rs.360). Interest on the fixed capital excluding land was calculated maximum in large farms (Rs.52.5) and least was found in marginal farms (Rs.48.5). In the same way total fixed cost was

found maximum in large farms (Rs.10621.5) and least was found in marginal farms (Rs.10510.4), on all farms basis it was calculated Rs.10573. Total cost incurred per hectare *i.e.* cost of cultivation or Cost C3 was found

Table 2 : Cost of cultivation of mustard crops

Particulars	Marginal	Small	Medium	Large	All farm
Human	5230	6100	6950	7800	6520
Hired	2000	3800	4000	4250	3512.5
Family	5250	4520	3250	2580	3900
Machinery	5520	6800	7520	7800	6910
Seeds	430	590	680	500	550
Fertilizer	1350	1405	1550	1850	1538.75
Urea	450	550	650	700	587.5
D.A.P	1250	1450	1500	1600	1450
Manures	1400	1450	1350	2300	1625
Irrigation	3300	3800	4100	3500	3675
Plant protection	400	550	700	600	562.5
Total working capital	26580	31015	32250	33080	30731.25
Interest on working capital	1250	1245	1450	1250	1298.75
TVC	49030	55942	59182	60212	56091.5
Rental value of land	10000	10000	10000	10000	10000
Depreciation	360	385	470	485	425
Rent paid for the land	34	34	34	34	34
Interest on Fixed capital	48.5	50.5	51.5	52.5	50.75
T F C	10510.4	10552.2	10611.6	10621.5	10573.93
Cost A1	19856	22654	23560	24800	22717.
Cost A2	25456	26896	23897	33650	27474
Cost B1	19325	20145	22451	24632	21638
Cost B2	18620	59682	32845	34521	36417
Cost C1	21500	26341	24621	26962	24856
Cost C2	31652	36248	39650	40850	37100
Cost C3	36850	39654	38520	39562	38646

Table 3 : Returns of cultivation of mustard in the study area

Inputs	Marginal	Small	Medium	Large	All farms
Main product (Qtl)	2.517	4.651	8.119	8.947	15.143
Main product value (Rs.)	8145.714	14956.140	26467.880	29499.670	48307.140
By product value (Rs.)	616.286	1122.727	1666.500	1401.000	1090.000
Main product unit price (Rs./Qtl)	3261.347	3247.691	3296.107	3312.500	3185.714
Gross income (Rs.)	8762.000	16078.860	28134.380	30900.670	49397.140
Cost C1 (Rs.)	5903.192	10564.47	13477.76	16272.8	17764.19
Cost C2 (Rs.)	8207.286	15695.22	21875.48	25027.68	31413.46
Cost C3 (Rs)	11250.25	13568.56	14582.65	16850.58	14063.01
Return 1 (Gross income - cost-C1) (Rs.)	2858.808	5514.395	14656.620	14627.870	31632.950
Return 2 (Gross income - cost-C2) (Rs.)	554.714	383.644	6258.893	5872.983	17983.680
BC Ratio	1.39	1.48	1.62	1.53	1.50

maximum in large farms (Rs. 39562) and lowest in marginal farms (Rs. 36850), on all farms basis it was calculated Rs. 38646. The discussed findings are reflecting the same results and supported by the findings of Prasad *et al.*, 1992.

From the Table 4 shows the cost of production and returns structure on mustard growing farms of Aruvai block. Average yield of mustard found highest among large farms followed by medium, small and marginal *i.e.* 8.94, 8.11,4.65 and 2.51(quintal per hectare), respectively, on all farms basis it was found 15.14 quintals per hectare. Gross return was calculated maximum in case of large farms (30900) followed by medium farms (28134), small farms (16078) and least in marginal farms (8762), on all farms basis it was found 49397. The net income per hectare over cost C1 is highest in large farms (16272) and lowest in marginal farms (5903). Net income over cost C2 and C3 also followed the same trend. The cost of production (cost C3) was found highest in large farms (16850) followed by medium farms (14582), small farms (13568), and marginal farms (11250), on all farms basis it was found Rs.14063. Benefit-cost ratio shows the income received against per rupees' investment. The BC ratio was found highest in case of medium farms *i.e.* 1.62 and was lowest in case of marginal farms *i.e.* 1.39. The above findings are also supported by the findings of Dinesh *et al.* (2018) and Kumar (2021).

Mustard, a crucial oilseed crop, is traded extensively

Table 4 : Mustard markets in India	
State	Major Trading Centres of Mustard
Rajasthan	Alwar, Bharatpur, Kota, Jaipur, Ganganagar and Bikaner
Delhi	Delhi
Uttar Pradesh	Jhansi, Hapur and Kanpur
West Bengal	Kolkata and Burdwan
Maharashtra	Mumbai
Madhya Pradesh	Indore

across various major trading centers in India. In the northern state of Rajasthan, the cities of Alwar, Bharatpur, Kota, Jaipur, Ganganagar and Bikaner serve as key hubs for mustard trade. These centers play a pivotal role in facilitating transactions, connecting farmers and producers with buyers and distributors. The strategic location of these trading centers in Rajasthan ensures efficient market access and distribution, contributing significantly to the state's agricultural economy.

Moving towards the central and eastern regions, Uttar Pradesh has emerged as another prominent player in the mustard trade. The cities of Jhansi, Hapur, and Kanpur serve as major trading hubs, providing a crucial link between mustard-producing regions and markets. In West Bengal, Kolkata and Burdwan stand out as key trading centers, facilitating the flow of mustard from local farmers to consumers. Additionally, the mustard trade extends its reach to Delhi, the national capital, where trading activities contribute to the vibrant agricultural commerce of the region. Maharashtra, with Mumbai as a significant trading center, and Madhya Pradesh, with Indore playing a pivotal role, further underline the widespread network of mustard trade across the country. Overall, these trading centers collectively contribute to the economic vitality of the mustard industry, fostering a dynamic and interconnected market for this essential oilseed crop.

It could be inferred from the Fig. 1 as the number of days increases the price level is decreasing by Rs.3/ quintal. Hence, from the model there is a variation by 44 per cent in Y (dependent variables) is explained by the time period. The availability of produce and the demand for it in the various seasons is caused by the seasonality in prices and arrivals of the produce. Because of this, market prices fall when there are more new arrivals and rise when there are fewer new arrivals. According to the findings, high seasonal indices of arrivals are seen during the months of March through June for all of the selected commodities. This finding suggests that there are many post-harvest arrivals during these months. During the peak harvest season, there were a lot of customers, which kept prices low; however, during the shoulder seasons, there was a lack of supply and inadequate storage, which caused prices to skyrocket.

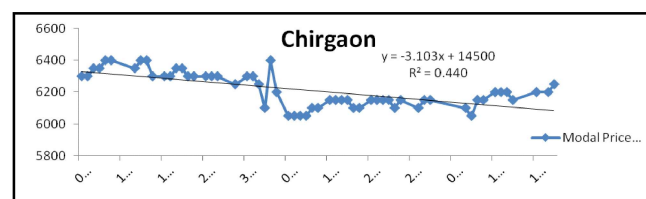From the Fig. 2 it is observed that as the number of

Fig. 1: Arrival and dispatch of commodities from Chirgaon

days increases the price level also increases by Rs.3/ quintal. Hence from the model depicts the presence of variation by 21 per cent in Y (dependent variables) is explained by the time period. The variation found during

May 9 and 16 played an important role in the supply of mustard in the observed market. Over the years, the production of mustard has shown an increasing trend besides there is lack of storage and infrastructure facilities which is an area of concern which needs to be redressed by the government and the Farmer producer organizations.

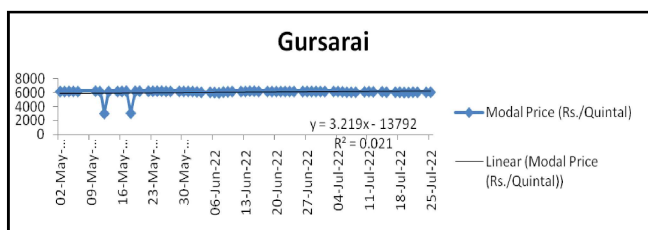As it can be seen from the Fig. 3, the price increases

Fig. 2: Arrival and dispatch of commodities from Gursarai

by Rs. 1 per quintal for each passing day after the completion of the transaction that caused the price to be initially established. The passage of time is the only factor that can adequately explain the presence of variation in Y (the dependent variables) by a factor of 12%, which is the conclusion that can be drawn from these findings. The observed distribution of mustard in the market was significantly impacted by the variation that was discovered between may 9 and may 16, and this variation played a significant role.
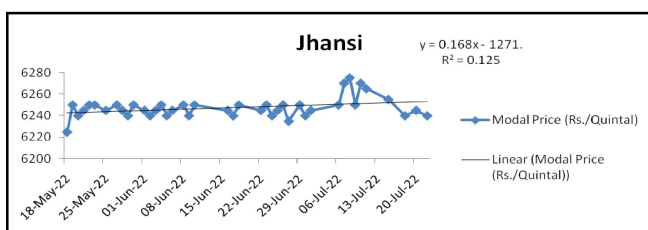
From the Fig 4, it is evident that the price increases

Fig. 3: Arrival and dispatch of commodities from Jhansi

by Rs. 2 per quintal for day after the completion of the transaction where the price has to be established at the earlier stage. The time factor that can adequately explain the presence of variation in Y (the dependent variables) by a factor is represented by 33%, The observed distribution of mustard in the market was significantly impacted by the variation that was discovered between July 7 and June 21 and this variation played a significant role.
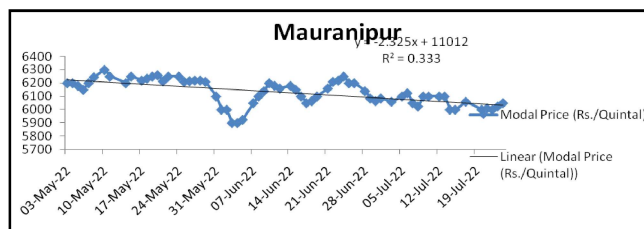
Conclusion :

Fig. 4: Arrival and dispatch of commodities from Mauranipur

The cost of cultivation of the mustard crop among various sample farms in Aurai block of Jhansi district of Bundelkhand region have been worked out based on primary data. Over all farms basis the human labour cost was found Rs.6520. Cost incurred on fertilizers was found maximum in large farms (Rs. 1850) and least in marginal farms (Rs. 1350), on all farms it was found Rs.1538.75. Cost incurred on Urea was found maximum among large farms *i.e.* Rs.700 and least among small farms (Rs.450), on all farms basis cost incurred on urea was found Rs. 587. Cost incurred on Phosphorous was found maximum among large farms *i.e.* Rs.1600 and least among marginal farms (Rs.1250), followed by Rs. 1450on urea. Total variable cost was found maximum in large farms *i.e.* Rs.33080.66 and least in marginal farms (Rs.26580), As far as the overall farms basis is concerned it was found to be Rs.30731. Total cost incurred per hectare *i.e.* cost of cultivation or Cost C3 was found maximum in large farms (Rs. 39562) and lowest in marginal farms (Rs. 36850) and for all the farm size it was calculated Rs. 38646.

It has been observed that the price level rises by Rs.3/quintal for every day that passes since the beginning of the countdown. As a result, the model depicts the presence of variation in Y (dependent variables) that is explained by the time period. This variation accounts for 21% of the total. The variation that was discovered between May 9 and May 16 played a significant role in the distribution of mustard in the market. In spite of the fact that there is a lack of storage and infrastructure facilities, mustard production has shown an upward trend over the years. This is a cause for concern that the government and farmer producer organisations need to address in order to improve the distribution pattern to different markets across states.

After the completion of the transaction which caused the price to be initially established, there is a one rupee per quintal increase in cost for each passing day after the completion of the transaction. The only factor that can adequately explain the presence of variation in

Y (the dependent variables) by a factor of 12%, which can be drawn from these findings, is by the passage of time. This is the only factor that can adequately explain the presence of variation in Y. The variation that was discovered between May 9 and May 16, and this variation had a positive impact on the observed distribution of mustard in the market, and this variation had a significant role to supply chain management of mustard market.

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