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Study on economics of production of rapeseed-mustard in district Lakhimpur Kheri, Uttar Pradesh

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Abstract
An attempt has been made in this study to examine the economics of production of rapeseed-mustard in district Lakhimpur Kheri, Uttar Pradesh. The study was conducted in Palia Kalan block in Lakhimpur Kheri district of Uttar Pradesh State, India. Fifty farmers were selected randomly from five villages from the block to collect the required information on the cost of cultivation aspects for the present study. The data were collected by survey method with personal interview from the respondents to the help of pre tested schedules for the production year 2017-18. Secondary data were obtained from official record, reports and bulletins .The average size of sample holding was 1.95 hectares. The main crop on sample farm was mustard. The average cropping intensity of the sample farms was 181.45 percent. The per hectare input cost being Rs. 39450.30 per hectare on marginal farms was lower as compared to Rs. 40859.46 per hectare on small farms and Rs. 42856.81 per hectare on large farms. Total average cost was Rs. 41055.52 per hectare. The net returns were highest of large farms Rs. 26233.19 followed by small farms and marginal farms Rs.24065.54 and Rs. 22487.20 respectively.

Keywords: Rapeseed-mustard, cost and returns, cropping intensity and major constraints

Introduction
India is greatest economy of edible economy in the world and ranking the third position after USA and China. It occupies a distinct position in the term of area under oil seed and also in term of diversity in cultivated oil seed. India is the world largest producer of groundnut, sesamum, peanut and Niger, second largest producer of caster and safflower as well as producer of rapeseed mustard and linseed. Besides soybean and safflower is also gradually occurring importance.

During a major part of the nineteenth century and even earlier India has been an important exporter of vegetable oils and ghani manufactured oil had an important place in the international oil trade. However, in the later part of the last century its ghani industry faced severe competition from the western mill industry and consequently India lost much of the foreign market and instead become an importer of edible oils/oilseeds to meet the growing domestic demand for human consumption and other purpose.

Although the area under cultivation increased considerably, the progress is still far below the desired level. This is mainly because of oilseeds (Rapeseed-mustard) are cultivated mostly in unirrigated, semi-arid areas and hence remain vulnerable to vagaries of nature. Secondly, they are cultivated mainly by small and marginal farmers who are still not well adapted to new farm technologies and thirdly, the progress in respect of oilseeds has not been substantial mainly because food grains were given first priority in research and development. In the second phase of the agricultural development programme top priority is being given to produce high-yielding varieties of oilseeds which could grow well under rainfed condition.

India holds a premier in the global oilseed scenario accounting for 19.3 per cent of the area and 11.1 per cent of the total production. The estimate area, production and yield of rapeseed mustard in the world was 5745.52 million ha, 6796.72 million tonnes and 1160 kg per hectare. India accounts for 23 per cent and 10 per cent of the total acreage and production of mustard (USDA 2016).

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However, the productivity in the world is 2144 kg per hectare. Oilseed from the second largest commodity after cereals in India, sharing 17.5 per cent of the country grass area and accounting 7.2 per cent GNP and 10 per cent value of all agricultural product about 14 million people are engaged in production and 1 million person in processing of oilseed. Area under oilseed crop in India is 29 million hectare during 2015-16 and production is 33 million tonnes.

Uttar Pradesh accounts for nearly 60 per cent of the area and production of rapeseed mustard in country production of rapeseed mustard group of crops account for about 33 per cent of total oilseed production in India. The yield level of rapeseed mustard have gone upto 960-1161 kg per hectare while sunflower yield have increased from 301-624 kg per hectare, groundnut yield improved from 809-1061 kg per hectare present in India. (Directorate of oilseed research Hyderabad) This mustard is the most important oilseed crop after groundnut under this group, several oilseeds belongs to family cruciferae are grown in India. Area of rapeseed mustard crop in U.P have 785000 hectare during 2016-17 also production is 848000 million tones and yield is 1080 kg per hectare (Area as per Govt. estimates 2016-17). In U.P. prominently cultivation of rapeseed mustard districts are Agra, Kanpur, Etawah, Faizabad, Allahabad, Lakhimpur Kheri and Farrukhabad.

In Lakhimpur Kheri district rapeseed mustard occupies an area about 27347 ha with account for 3.94 % of total cropped area the area and production is 19010 metric tonnes (district statistical bulletins).

Methodology
Sampling technique: Purposive sample and multi-stage stratified random sampling technique were adopted for selection of block, village and farmers for the investigation. The district Lakhimpur Kheri is selected purposely as this district has a large area under rapeseed mustard crop.

Selection of District
Lakhimpur Kheri district of was selected purposively to avoid the operational inconvenience of the investigator.

Selection of Block: A list of all rapeseed mustard growing block of district Lakhimpur Kheri was prepared and out of this one block "Palia Kalan" was selected at random process.

Selection of village: A list of all villages growing mustard crop of the selected Block "Palia kalan" was prepared and from it five villages were selected randomly at first stage.

Selection of respondents

Lists of Rapeseed- mustard growers of selected villages were prepared along with their size of holding. Thus, the farm holding categorised into three size groups (1) Marginal: (Below 1.0 ha) (2) Small: (1.0-2.0 ha) (3) Medium: (2ha & above). From this list a sample of 50 respondents were selected following the proportionate random sampling technique.

Collection of Data: Primary data were collected through personal interview method on well pre-structured schedule specially designed for this study, while secondary data were collected from published/ unpublished record of district and blocks, headquarters, books, journals, periodicals, and news bulletins etc. among different Rapeseed- mustard grown in Lakhimpur Kheri district,.

Period of study: The data pertained for the agriculture year 2017-2018.

Analytical Tools: The following statistical tools were used in the analysis and interpretation of the data.

(A) Average: The following average were used for the study
(a) Arithmetic mean = $\Sigma X/N$
(b) Weighted average = $\Sigma W_i X/\Sigma W_i$

Where,
X = Value of an item
W_i = Weight of item
N = No. of item

Tabular analysis: Tabular analysis was used to compare the different parameters among marginal, small medium and large size group of the farmers. Investment pattern per hectare and per farm, cropping pattern and cropping intensity etc. were computed and presented in tabular forms. In this computation weighted average was used.

Results and Discussion
This discussion deals with the finding of the present study i.e. cropping pattern and cropping intensity, per hectare investment, item-wise cost of input and its breakup, Cost of cultivation per hectare on cost concept, yield per hectare and cost of production per quintal and cost of return from mustard.

Cropping pattern of the sample farms
The pattern of growing the crops on the farm is one of the important indicators of determining the level of employment and income of the farmers.

Table 1: The distribution of cropped area under different crops of different categories of the sample farms.

Particular	Size of group			Total
	0-1	1-2	2&above	
Paddy	4.50 (21.79)	8.25 (23.57)	14.00 (21.60)	26.75 (22.20)
Wheat	3.40 (16.46)	6.90 (19.79)	13.50 (20.83)	23.80 (19.75)
Groundnut	2.75 (10.32)	4.00 (11.42)	8.60 (13.27)	15.35 (12.74)
Rapeseed mustard	2.25 (10.89)	3.00 (8.57)	8.00 (12.34)	13.25 (11.00)
Arhar	0.85 (4.11)	0.25 (0.70)	0.80 (1.23)	1.90 (1.57)
Gram	0.80 (3.87)	1.00 (2.85)	1.25 (1.92)	3.05 (2.53)
Maize	2.00 (9.68)	2.70 (7.71)	3.50 (5.40)	8.2 (10.95)
Sugarcane	3.60 (17.43)	8.00 (22.85)	13.85 (21.37)	25.45 (21.12)
Barseemcharry	0.30 (1.45)	0.50 (1.42)	0.75 (1.15)	1.55 (1.28)
Others	0.20 (0.96)	0.40 (1.14)	0.55 (0.84)	1.15 (0.95)
Total cropped area	20.65 (100)	35.00 (100)	64.80 (100)	120.45 (100)

Notes: (Table in bracket denotes percentage of their respective values)

Table-1 Shows that wheat Paddy & Sugarcane are the main crop grown by the sample farms. Mustard crop occupied as 11.00 per cent, wheat 19.75 per cent of total cropped area& other crops which are grown by the sample farms are Maize, groundnut and paddy covered 10.95 percent, 12.74 per cent and 22.20 per cent respectively of the total cropped area.

Intensity of cropping

Intensity of cropping is an indicator of the efficiency of a farm. Higher the intensity of cropping generally high would be the income and employment. It is worked out by using the following formula.

$$\text{Intensity of Cropping} = \frac{\text{Total cropped area}}{\text{Net cultivated area}} \times 100$$

Table 2: Intensity of cropping on different categories of farms

S. No.	Size group (in ha)	Net cultivated area (in ha)	Total cropped area (in ha)	Intensity of cropping (in %)
1.	0-1	10.78	20.65	191.78
2.	1-2	20.10	35.00	174.12
3.	2& above	35.50	64.80	182.53
4.	Total	66.38	120.45	181.45

The above table-2 reveals that the average intensity of cropping at sample farms came to 181.45 per cent while it was highest at marginal farms 191.78 per cent and lowest at small farms 174.12 per cent.

Per hectare investment of fixed capital
Table-3 indicates that the average investment on fixed capital including land, on an average, came to Rs. 266406.28 per hectare. The investment on draft cattle per hectare shows a decreasing trend with the increasing in the size of holding because the farmers of large size groups did not maintain livestock in production to their size of farms other hand, the investment on agriculture implement and machineries, irrigation structure and total investment on fixed capital shows an increasing trend with increasing in the size of holding. This increased investment was mainly due to higher invest capacity of the large farms.

Table 3: Per hectare investment of fixed capital on the sample farms of different sizes

S. No.	Particulars	Size of groups			Average
		0-1	1-2	2 & above	
1.	Land	250000 (95.18)	250000 (93.83)	250000 (92.54)	250000 (93.84)
2.	Farm building	2045.27 (0.77)	3026.79 (1.13)	4430.65 (1.64)	3167.57 (1.18)
3.	Livestock (a) Milch	2850.25 (1,08)	3800.45 (1.42)	4075.69 (1,50)	3575.46 (1.34)
	(b)Draft cattle	1928.38 (0.73)	1739.78 (0.65)	1698.55 (0.62)	1788.90 (0.67)
4.	Agri. Implement Machineries	2736.28 (1.04)	3701.48 (1.38)	4778.63 (1.76)	3738.79 (1.40)
5.	Irrigation structure	2750.25 (1.04)	3750.10 (1,04)	4840.80 (1.79)	3713.85 (1.39)
6.	Other	330.00 (0.12)	410.10 (0.15)	425.00 (0.15)	388.03 (0.14)
7.	Total investment including land	2626640.43 (100)	266429.10 (100)	270149.32 (100)	266406.28 (100)

Note: (Table in brackets denotes percentage of their respective value).

The breakup of the different input items in mustard production: The breakup of the different input items in mustard production on per hectare basis has been the presented in Table-4.

Table 4: Item-wise cost and its breakup in mustard cultivation (in Rs/ha)

Factor of input	Size group of farm (in Rs.)			Average
	0-1	1-2	2 & above	
Human labour	5650 (14.32)	6000 (14.68)	6267 (14.62)	5972.33 (14.54)
(a) Family labour	4100 (10.39)	3300 (8.07)	1200 (2.80)	2866.66 (6.98)
(b) Hired labour	1550 (3.92)	2700 (6.60)	5067 (11.82)	3105.66 (7.56)
Bullock labour/Tractor power	3474 (8.80)	3502 (8.57)	3697 (8.62)	3557.66 (8.66)
Seed	400 (1.01)	475 (1.16)	500 (1.16)	458.33 (1.11)
Manure & Fertilizer	6503 (16.48)	6912 (16.91)	7508 (17.51)	6974 (16.980)
Irrigation	1425 (3.61)	1550 (3.79)	1610 (3.75)	1528 (3.72)
Plant protection	540 (1.36)	694 (1.69)	1252 (2.92)	895 (2.17)
Interest on working capital	719.68 (1.82)	765.32 (1.87)	833.36 (1.94)	772.78 (1.88)
Rental value of land	20000 (50.69)	20000 (48.94)	20000 (46.66)	20000 (48.71)
Interest on fixed capital	738.62 (1.87)	961.14 (2.35)	1189.45 (2.77)	963.04 (2.34)
Total input cost	39450.30 (100)	40859.46 (100)	42856.81 (100)	41055.52 (100)

Note: (Table in brackets denotes percentage of their respective value).

Table-4 reveals that on an average the inputs cost per hectare of mustard came to Rs.41055.52 which increased with the size of farms because of the large farmers could incurred higher expenditure on cash inputs like hired labour (Human), manure and fertilizers, irrigation, tractor power, plant protection etc. Manure and fertilizer accounted for highest expenditure Rs. 6974.33 followed by Human Labour Rs. 5972.33 and bullock labour tractor power accounted for Rs. 3557.66 as variable cost in mustard production per hectare.

Cost of cultivation per hectare on cost concept
The break up cost according to different cost concept used in farm management studies have been work out in Table-5

Table 5: Cost of cultivation on cost concepts.

Particular	Size group of farms (in ha)			Average
	0-1	1-2	2 & above	
Cost A	14611.68	16598.32	20467.36	17225.78
Cost B	35350.30	37559.46	41656.81	38188.52
Cost C	39450.30	40859.46	42856.81	41055.52

Table-5 reveals that on an average cost A, cost B and cost C on mustard production were worked out at Rs.17225.27, Rs.38188.52, Rs.41055.52 per hectare respectively. These costs showed on increasing trend with the increase in size group of holding. It was due to higher investment capacity of large farmers.

Yield and cost of production from mustard: The per hectare yield obtained from mustard crop and its cost of production on the per hectare basis has been presented in table-6.

Table 6: Yield per hectare and cost of production per quintal.

Particular	Size group of farms (in ha)			Average
	0-1	1-2	2 & above	
Yield of mustard in quintal per hectare				
Main product	14.80	15.50	16.50	15.60
By product	18.25	19.50	20.60	19.45
Price/quintal (in ha)				
Main product	4000	4000	4000	4000
By product	150	150	150	150
Gross income	61937.50	64925	69090	65317.50
Total input cost	39450.30	40859.46	42856.81	41055.52
Cost of production per quintal (in ha)				
Cost of production per quintal	2547.74	2517.33	2481.21	2515.42

Table-6, displays that the production of mustard per hectare is highest at 2 hectare & above size group of the large farms compared to the 1-2 and 0-1hectare size group of the farms. The large farmers adopted new technology certified seed and optimum doses of fertilizer and manures. Similarly per hectare gross income is also higher on 2 & above ha size group of large farms than 0-1 hectare and 1 -2 hectare size group of the farms. Consequently, where as marginal farmers invested to produce Rs.2547.74 quintal while on an average cost of production of mustard came to 2515.42 per quintal.

Cost and return from mustards: The average inputs cost, gross income, net income; family labour income and farm business income from the mustard crop under different size group of farms has been presented in Table-7.

Table 7: Cost and return in mustard crop (in Rs.) per hectare.

Particular	Size group of farms(in ha)			Average
	0-1	1-2	2 & above	
Input cost	39450.30	40859.46	42856.81	41055.52
Gross income	61937.50	64925	69090	65317.50
Net income	22487.20	24065.54	26233.19	24261.98
Family labour income	26587.20	27365.54	27433.19	27128.64
Farm business income	47325.82	48326.68	48622.64	48091.71
Input output ratio	1:1.57	1:1.58	1:1.61	1:1.58

Table-7 reveals that mustard crop gave an average net income of Rs.24261.98 per hectare and family labour income; farm business income came to Rs.27128.64Rs.48091.71 per hectare respectively. The input output ratio came to 1:1.58.

Constraints: Generally most of the farmers are using low quality seed with low germination percentage by several farmers of the study area. Farmers have no knowledge of chemical control of these pests and even the timely of effective control. The timely unavailability of irrigation affects the crop adversely. It is an important application of low yield. Sulphur and nitrogen more needed by the crop farmers not applied adequate quantity of fertilizers.
Late Sowing is also a factor which effects the production due to late sowing mustard production level dose not increases favourable significantly mostly farmers depends on rain for getting favourable condition of field for sowing crop. Farmers sowing the mustard in III and IV week of October there by reducing the yield of crop. The method of sowing of Mustard crop is usually sown by broadcasting method.

Suggestions
In the favour of increasing the productivity and area under mustard crop several constraints affected it following solution measures may be adopted for solving such difficulties. The recommended dose of N.P.K. &Sulphur per hectare must be applied. Improved package of practices proper time of sowing use of proper seed rate and maintenance of spacing (40 X 15) cm will improve the productivity of mustard. If there is not rainfall at the time of fruit formation then the irrigation must be done for optimum level of production.

Conclusion
In the study Lakhimpur Kheri district of western U.P was selected purposively for the data collection of mustard cultivation. Data of production of mustard
Cultivation was collectively by the 50 respondents through personal interview method. In the case of cropping pattern medium farmer used higher proportion of their area of rapeseed-mustard cultivation and higher cropping intensity was marginal farmers. The per hectare input cost being Rs. 39450.30 per hectare on marginal farms was lower as compared to Rs. 40859.46 per hectare on small farms and Rs. 42856.81 per hectare on large farms. Total average cost was Rs. 41055.52 per hectare. The net returns were highest of large farms Rs. 26233.19 followed by small farms and marginal farms Rs. 24065.54 and Rs. 22487.20 respectively.

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