The Pharma Innovation

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Costs and returns and input-output ratio of lentil on different size group of farms in Lakhimpur (Kheri) district of Uttar Pradesh

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Abstract
Lentil pulse crop on account of their vital role in nutritional security and soil ameliorative properties have been an integral part of sustainable agriculture since ages. The decrease in production and shrinkage in the area of pulse crops in Lakhimpur (Kheri), Uttar Pradesh is a cause of great concern. Keeping in view the importance of Lentil pulse crop as a source of nutritional security, income and employment generation in its cultivation, disposal and industrial uses, a study on "Costs and returns and input-output ratio of lentil on different size group of farms in Lakhimpur (Kheri) district of Uttar Pradesh" was conducted.
Main objectives were to analyse the costs and returns and input-output ratio of lentil on different size group of farms. One hundred respondents were selected from Mitauli block of Lakhimpur (Kheri) district including all three categories of the farm size. Tabular and functional analyses were done to find out the results. The total cost of production incurred by the small farms were high as compared to medium and large farms. The gross returns obtained per hectare by large size farms were high as compare to medium size farms and small size farms respectively. The disposable pattern of lentils shown in the table reveals that Total production was highest in large size farms (16.8 quintals) as compared to medium size farms (15.1 quintals) and small size farms (15 quintals).

Keywords: cost, return, input-output, input-output ratio, income, disposable pattern

Introduction
In post-independence era, India has experienced many changes in agricultural development and green revolution was most spectacular. The production of cereals has registered higher positive compound growth rate as compared to the production of pulses in India during the last five decades. Thus, though India has made a significant headway in increasing agricultural production in general, pulses have continued to evade solutions for people diet. As a result, largest producing country continuously becomes deficient in pulses production.

Lentil is one of the important Rabi pulses which are equally oldest and the most nutritious also. It has the potential to cover the risk of dry land agriculture. It is also used as a cover crop to check the soil erosion in problem areas. It is mostly eaten as dal by converting into split pulse or "dal" by the removal of the skin and the separation of the fleshy cotyledons. These are deep orange red or orange yellow in colour. Whole pulse grains are also used in some of the dishes. It is cooked easily and hence preferred .It is good for patients too. The dry leaves and stems, empty pods and broken bits all are used as cattle feeds.

In India pulses markets are thin which leads to high market prices but the production of pulses has not increased. This is due to lack of input investment and dynamic weather conditions that led to crop's vulnerability to biotic and abiotic stress. Other main reason due to which Indian farmers were remains unattractive to produce pulses was indeterminate growth of crop and lack of government policies. The gap between supply and demand frameworks has been increasing with increase in population. The high price of pulses clearly reflects the demand pressure on the pulses.

In Lakhimpur (Kheri) Uttar Pradesh, pulses/lentils are grown on a huge scale. There has been large scale increase in area under lentils in the recent years and such a phenomenon is likely to create the problems relating to production and marketing aspects. Consequently, the rationality of the pattern of existing resource allocation has to be evaluated to find out the best combination that could be suggested to maximize the yield. In the production and marketing of lentils farmers face many problems like transfer of technology, supply of quality seeds, arrangement of industrial credit, fertilizers and other inputs, market arrangements, frequent

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price fluctuations in markets, lack of transport facilities during peak periods, etc. The present study is an effort in the direction of study in all aspect of cost and returns in lentils farming. The facts revealed by the study would help in assessing the profitability at existing technological level. Based on the profitability assessment, financial institution can find out market of lending money.

Materials and Methods
Out of 15 Blocks of Lakhimpur (Kheri) District1, Mitauli was selected purposively as Lentil growers were found in large numbers. 5 villages namely Khundehra, Jankinagar Grant, Lohana, Pipariya Khati and Bichiya Nagar were selected purposively where production of lentils was found to be highest.

Out of the total farmers in the selected villages a list was prepared on the basis of land holding and out of that 10% farmers were selected from each selected village. Then a separate list of lentil growers of selected villages was prepared along with their size of holding and further it was grouped into three categories *i.e.*

Small farmer (< 1 ha).
Medium farmer (1-2 ha).
Large farmer (2-4 ha).

At last 100 respondents were selected randomly for study purpose. The structured and pilot-tested questionnaire was used to collect the data, and then collected data was calculated and analyzed by using average and percentage and Garrett ranking technique was used. The period of the study was: 1st December 2020-31st May 2021.

Tabular presentation was adopted to compile the general characteristics of the

- Different size of farm respondents.
- Availability, utilization and repayment of credit by the borrowers.
- For the interpretation of data the following analytical tools was used:

Percent
A percentage is the number of a function whose denominator is 100. In other word it is a decimal part of 100.

Average
An average is a practice yet simple divergent individ1ual volume in other word, it is the consolidated result of complex distribution. The best knows as most commonly used form of average is the arithmetic mean.

Average

$$= \frac{Sum\ of\ terms/values}{Number\ of\ terms/values}$$

Arithmetic mean
The arithmetic mean is obtained by dividing the sum of values of observations by the number of observation; it is usually denoted by $\bar{X}$.

$$A.M = \frac{\sum X}{N}$$

Where,
- A.M = Arithmetic mean.

- X = Variate values (value of the variable).
- N = Size of the sample.

Cost concepts
Cost A₁: It includes the value of
- Imputed value of machine charges.
- Cost of seeds.
- Cost of fertilizers.
- Cost of pesticides.
- Cost of manuring.
- Cost of irrigation.
- Miscellaneous charges.
- Interest on work capital.
- Depreciation on fixed resources.
- Land revenue paid to government.

Cost A1: It includes the value of the total of all these cost makes up cost A1.

Cost A2: Cost A1 + rent paid for leased in land.

Cost B1: Cost A2 + interest on value of owned fixed capital assets (Excluding land).

Cost B2: Cost B1 + rental value of owned land.

Cost C1: Cost B1 + imputed value of family labour.

Cost C2: Cost B2 + imputed value of family labour.

Cost C3: Cost C2 + 10% of C2 (managerial cost).

Cost of production
Benefit/cost ratio
The benefit/cost ratio (BCR) will be worked out by using following formula.

$$B{:}C\ ratio = \frac{Present\ Worth\ of\ benefit}{Present\ Worth\ of\ Cost}$$

Measures of farm profitability
- Gross income = Per quintal price* yield per hectare in quintal.
- Farm business income = Gross income – Cost A_2.
- Farm business income = Gross income – Cost A_2.
- Net income = Gross income – Cost C.
- Family labour income = Gross income – Cost.
- Input output ratio (cost benefit ratio) = Cost C - Gross income.

Results and Discussion
Per hectare costs of cultivation of lentil crop
The table 1 reveals that, among the three different size of farms, total cost incurred by the small farms were high (Rs. 40265.01/ha) as compared to medium and large size farms (Rs.31121.47/ha and Rs. 29303.94/ha). Sample average for total cost was Rs. 33563.48/ha in different size of farms group.

The cost of harvesting, hoeing/weeding and threshing/winnowing were the highest contributors in the total cost of production and the rest all factors like cost of seeds, cost of fertilizers, manures were comparatively low .land preparation costs higher in human labour category as it involves preparatory tillage and clearing the field with respect to the lentil farming requirements.

The cost of seed is relatively low in large farms groups with 388/ha as large farms buy or cultivate in bulk quantities when compared to medium and small. Hence it costs 397/ha in medium and 422.67/ha in small.

Interest on working capital is paid at 8% which is obviously low in large as working cost is low in large farm group at 998.43/ha followed by medium and small farm group with Rs.

1037.19/ha and Rs. 1082.80 /ha respectively.

Rental value of owned land is more in small with Rs. 11250/ha followed by medium Rs. 10500/ha and large Rs. 9750/ha. Imputed value of family labour is less in large as very few family members involve in farming practice i.e. Rs. 1850/ha in large followed by medium and small respectively.

Table 1: Resource use and Cost of cultivation of lentils per hectare in different Size of Farms Group (Rs./ha)

S. No.	Particulars	Size group of farms			
		Small	Medium	Large	Overall average
1.	Hired labour	6800	6229.96	5745.45	6258.47
2.	Preparatory Tillage	945.45	864	853.33	887.59
3.	Seed	422.67	397	388	402.55
4.	Sowing	400	400	400	400
5.	FYM	0	0	0	0
6.	Fertilizer Nutrients	443	422.73	420	428.57
a.	Nitrogenous	0	0	0	0
b.	Phosphatic	443	422.73	420	428.57
c.	Potassic	0	0	0	0
d.	Zinc Sulphate	0	0	0	0
7.	Irrigation	206	180	177.27	187.75
8.	Hoeing/Weeding	1281	1090.91	1036.67	1136.19
9.	Plant Protection	730	715	700	715
10.	Harvesting	1204	1193.64	1188	1195.21
11.	Threshing/winnowing	1106.67	1074.55	1064	1081.74
12.	Miscellaneous	162	166.67	145.45	158.04
13.	Total working cost (1-12)	13535	12964.96	12480.45	12993.47
14.	Interest on working Capital @ 8%	1082.80	1037.19	998.43	1039.47
15.	Variable cost	14617.80	14002.15	13478.88	14032.95
16.	Depreciation on fixed capital	675	525	435	545
17.	Land revenue paid to Govt.	111.15	129.67	138.93	126.58
18.	Rental value of owned land	11250	10500	9750	10500
19.	Interest on fixed capital @11%	1241.48	1144.51	987.13	1124.37
20.	Imputed value of family labour	8709.13	1990.90	1850	4183.34
21.	Sub total	36604.56	28292.24	26639.94	30512.25
22.	Managerial Cost@10% of sub-total	3660.45	2829.22	2663.99	3051.22
	Grand total	40265.01	31121.47	29303.94	33563.48

Cost and Returns in lentil production per hectare in different Size of Farms Group (Rs./ha)

Table 2. Reveals that cost and returns in lentil production in different size of farms group. Among different size of farms groups, the total cost of production incurred by the small farms were high (Rs.40265.01/ha) as compared to medium (Rs.31121.47/ha) and large farms (Rs.29303.94 /ha). Sample average for total cost of production was Rs.33563.47/ha in different size of farms group. Yield of product is less in small size farms is 15 qtls/ha, as compared to medium 15.1qtls/ha and large size farms group is 16.8qtls/ha. Average yield h in

all three categories is 15.63 qtls/ha.

The gross returns obtained per hectare by large size farms were high (Rs.40887.46/ha) as compared to medium and small size farms (Rs.39854.34/ha and Rs.37003.34/ha) respectively. The net returns per hectare obtained by large size farms were (Rs.11583.52/ha) as compared to medium and small size farms (Rs.8732.87/ha and Rs4738.33/ha) respectively. Input output Ratio was highest in large size farms (1:1.5) followed by medium size farms (1:1.4) and lowest in small size farms group (1:1.35).

Table 2: Cost and Returns in lentil production per hectare in different Size of Farms Group (Rs./ha)

S. No.	Particulars	Size group of farms			
		Small	Medium	Large	Overall average
1.	Total cost of cultivation	33265.01	31121.47	29303.94	33563.47
2.	Yield(qtls/ha)	15	15.1	16.8	15.63
3.	Cost of production Rs/qtls	2684.334	2061.02	1744.28	2163.21
4.	Gross return	37003.34	39854.34	40887.46	41915.05
5.	Net returns	4738.33	8732.87	11583.52	8351.57
6.	B:C Ratio	1:1.35	1:1.4	1:1.5	1:1.41

Cost concepts in lentil production per hectare in different size of farms group (Rs./ha)

Table 3 reveals that cost concepts on different size of farms group per hectare. CostA1 was highest in small size farms Rs.

14617.80/ha followed by medium size farms Rs. 14002.15/ha and large size farms (Rs.13478.88/ha) respectively. Cost A2 in small, medium and large size of farms group was Rs. 14617.80/ha, Rs. 14002.15/ha and Rs. 18478.88/ha

respectively. Cost B_1 was highest in small size farms Rs. 15859.28/ha and lowest in large size farms Rs. 24216.018/ha as compared to medium size farms Rs 15146.67/ha

respectively. it is clear that the cost C_3 for small and medium holdings are higher with Rs. 3c holdings with Rs. 28730.01/ha.

Table 3: Cost concepts in lentil production per hectare in different size of farms group (Rs./ha)

S. No.	Cost concepts	Size group of farms			
		Small	Medium	Large	Overall average
1.	Cost A1	14617.80	14002.15	13478.88	14032.95
2.	Cost A2	14617.80	14002.15	18478.88	15699.61
3.	Cost B1	15859.28	15146.67	14466.018	15157.32
4.	Cost B2	27109.28	25646.67	24216.018	25657.32
5.	Cost Cl	52463.84	43438.91	41105.96	45669.57
6.	Cost C2	35818.41	27637.57	26066.01	29840.67
7.	Cost C3	39478.86	30466.79	28730.01	32891.89

Table 4: Measures of Farm profitability in lentil production per hectare in different Size of Farm Groups (Rs./ha)

S. No.	Particulars	Size group of farms			
		Small	Medium	Large	Overall average
1.	Gross Income	37003.34	39854.34	40887.46	41915.05
2.	Farm Business income	23385.54	25852.18	27408.57	27882.10
3.	Farm investment income	21676.41	23861.28	25558.57	23698.76
4.	Net Returns	4738.33	8732.87	11583.52	8351.57
5.	Family Labour Income	17894.06	16671.44	14207.67	16257.73
6.	Input output Ratio	1:1.35	1:1.4	1:1.5	1:1.41

Table 4 reveals that the gross returns obtained per hectare by large size farms were high (Rs. 40887.46/ha) as compare to medium size farms (Rs. 39854.34/ha) and small size farms (Rs. 37003.34/ha) respectively. This makes sample average for gross returns was Rs.41915.05/ha in different size of farms group. Farm business incomes in small, medium and large size of farms group were Rs. 23385.54/ha, Rs. 25852.18/ha and Rs. 27408.57/ha respectively.

Sample average for farm business income was Rs. 27882.10/ha in different size of farm group. The Net returns per hectare obtained by small size farms were low Rs. 4738.33/ha as compared to medium (Rs. 8732.87/ha) and large size farms (Rs. 11583.52/ha) respectively. Sample average for net returns was (Rs. 8351.57/ha) in different size of farm group. Family labor income in small, medium and large size of farm groups were (Rs. 17894.06/ha, Rs. 16671.44/ha and Rs. 14207.67/ha) respectively. Sample average for family labour income was (Rs. 16257.73/ha) in different size of farm groups Input output ratios for small, medium and large size of farm groups were (1:1.35, 1:1.4, 1:1.5) respectively. The sample average for Input output ratio

was 1:1.41 in different size of farms.

Disposal pattern of lentil production per hectare in different size of farms group (Qtl./ha)
Table 5 reveals the disposable pattern of lentils shown in the table reveals that Total production was highest in large size farms (16.8 quintals) as compared to medium size farms (15.1 quintals) and small size farms (15 quintals). Home consumption is mostly in small size farms as compared to medium and large size farms. Kind payment as wages is highest in large size farms as compared to small and medium size farms. Quantity used as gift for religious purpose is highest in large size farms. The highest percent of produce was retained by large size farms (0.77 quintals) followed by medium (0.68 quintals) and small size farms (0.60 quintals) respectively. This also indicated that highest percentage marketable surplus was found in small size farm group i.e. 96 percent followed by medium farm group with 95.49 percent and large size farm group with 95.41 percent. This makes the sample average for marketable surplus of 14.95 quintals with 95.63 percent.

Table 5: Disposal Pattern of lentil production per hectare in different Size of Farms Group (Qtl./ha)

S. No.	Particulars	Size group of farms			
		Small	Medium	Large	Overall average
1.	Total yield	15	15.1	16.8	15.63
2.	Home consumption	0.26	0.27	0.38	0.303
3.	Kind payments as wages	0.02	0.05	0.07	0.046
4.	Relatives and religious person	0.32	0.36	0.32	0.333
5.	Total retention	0.6	0.68	0.77	0.673
6.	Marketable surplus	14.4	14.42	16.03	14.95
7.	Marketable surplus %	96	95.49	95.41	95.63

Conclusions
We can conclude following from the above study: Table 1 reveals that, among the three different size of farms, total cost incurred by the small farms were high (Rs. 40265.01/ha) as compared to medium and large size farms (Rs.31121.47/ha and Rs. 29303.94/ha). Sample average for total cost was Rs.

33563.48/ha in different size of farms group.
Table 2 reveals that cost and returns in lentil production in different size of farms group. Among different size of farms groups, the total cost of production incurred by the small farms were high (Rs.40265.01/ha) as compared to medium (Rs.31121.47 /ha) and large farms (Rs.29303.94 /ha). Sample

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The study pertains to the economics of lentils production, the results revealing that the socio-economic status of respondents found to be moderate. Economics of lentil production is more profitable in large farms as compared to medium size farms and small size farms. Lower cost of cultivation was recorded on large farms due to their better purchasing power of inputs i.e. machine power, fertilizers, plant protection etc. as compared to medium and small farms. Among the different categories of farm, the net returns from lentil cultivation were highest in case of large farms followed by the medium farms and small farms. The large farmer in general fetches higher prices of their produce. As they sell a portion of marketable surplus in glut season due to their retention capacity while rest of marketable surplus is marketed by them at remunerative prices in non-production season.

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