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## A study of production of wheat in Hardoi district of western Uttar pradesh

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**Abstract**

India is one of the world's largest producers of wheat, accounting for 20% of all world wheat production. The area under wheat in India was reported 31.20 million hectares with the total production of 95.90 million tonnes, while productivity was recorded 30.88 quintal per hectare. The area under wheat in Uttar Pradesh was 98.10 Lakh hectares, and production was 303.00 Lakh tonnes while productivity 30.33 qt/ha.

**Keywords:** Production of wheat, Hardoi

**Introduction**

Wheat is an important food crop grown throughout the world. Wheat is the world's most widely cultivated staple food crop being grown since pre-historic period and being consumed in various forms by more than one thousands million people in the world. Wheat has emerged as the backbone of India food security as it contributed 35.50 per cent of the total food grain production of the country (2009-10). Wheat plays an important role in shaping agriculture and food security mission. India is the second largest producer of wheat next to China. The area under wheat in India was reported 31.20 million hectare (2013-14) with the total production of 95.90 million tonnes while productivity was recorded 30.88 qt./ha. The major wheat growing states in India are U.P., Punjab and M.P. During 2013-14, the area under wheat in Uttar Pradesh was 98.10 lakh hectares and production was 303.00 lakh tonnes while productivity was 30.33 qt./ha (D.E.S., Department of Agriculture & co-operation, Ministry of agriculture New Delhi, 2013-14). Hardoi district is also an important wheat producing district of U.P. The area under wheat in the district during 2013-14 was reported 316279 hectare with production of 10068 quintal while productivity was 31.83 qt/ha. (Arth Evam Sankhya Prabhag, Hardoi district, U.P. 2013-14). The demand of wheat is increasing and by 2020 it has been projected between 105-109 million tonnes. Most of this increase in production will have to manage from increase in productivity, as the land area under wheat is not expected to increase. During the post-green revolution period, the large scale adoption of new technology, particularly in wheat raised the production of food grain remarkably. To ensure the farmers adequate returns on their surplus produce The arrangements for marketing and the expansion of markets have to be made only for the surplus quantity available with the farmers, and not for total productions. The rate at which agricultural production expands determines the pace of agricultural development, while the growth in the marketable surplus. The knowledge of marketed and marketable surplus helps the policy maker as well as the traders. Some studies indicate that the marketed surplus-output elasticity of wheat in India. India where the production activity is carried out by millions of farmers is spatially. Keeping in view the above mentioned facts, an empirical evaluation of these factors are necessary. Hence, there is urgent need to collect information which would be of great importance to policy makers.

**Research Methodology**

The Study was based on the input-output data obtained from sample wheat growing farmers in up, In District of Hardoi Selected through multistage sampling design. At the First stage the major wheat growing district hardoi was purposively selected out of 19 block of the selected district 1 block namely bharkhani having highest area under wheat crop was selected purposively. A list of all the villages falling under selected block was prepared and arranged in ascending order according to area covered by wheat crop and five villages were selected randomly from the list. A separate list of wheat growers of selected five villages was prepared along with their size of holdings.

Thus the farm holding categorized in to three size of groups. (i) Marginal below 1 hectare (ii) small 1-2 hectare (iii) Mediums 2-4 hectare. from this list a sample of 100

respondents were selected following the proportionate random sampling technique as shown in Table 1.

**Table 1:** Total households and number of households selected under different size group of farms from sample villages

Name of village	Size-groups of farm							
	Marginal (Below 1.0)		Small (1.0-2.0)		Medium (2.0-4.0)		Total	
	P	S	P	S	P	S	P	S
Bharkhani	429	18	123	5	85	4	637	27
Rmapur	305	13	90	4	64	3	459	20
Hasnapur	256	11	74	3	56	2	386	16
Mannagala	349	14	104	4	74	3	527	21
Bilsarhilaran	255	11	74	3	52	2	381	16
Total	1594	67	465	19	331	14	2390	100

P=Total number of households, S=Selected number of households

Shahabad market where most of the food grain of study area are being disposed of as such leading Shahabad market was selected for the study of marketing aspects.

The secondary data were collected from published/unpublished record of district and block headquarters, books, journals; periodicals etc Primary data were collected through personal interview method on well-structured pre - tested schedule of enquiry by interview method.

Tabular analysis was used to compare the different parameters among marginal, small and medium size groups of the farmers. Family composition, investment pattern; crop-wise costs and returns etc. were computed and presented in tabular forms. In this computation weighted average were used.

$$W.A. = \frac{\sum W_i X_i}{\sum W_i}$$

Where,

- W. A. = Weighted average
- X<sub>i</sub> = Variable
- W<sub>i</sub> = Weight of variable

To study the effect of various independent variables on the dependent variables, various forms of production function were explored.

Cobb-Douglas production function, elasticity of production and return to scale, was found to be best fit for the analysis of data.

$$Y = ax_1^{b_1} .x_2^{b_2} .....X_n^{b_n}$$

Where,

- Y = Dependent variable (output value in rupees/hectare)
- X<sub>1</sub> = i<sup>th</sup> independent variable (input value rupees/hectare)
- a = Constant

b<sub>1</sub> = Production elasticity with respect to X<sub>1</sub>'s

The value of the constant (a) and coefficient (bi) in respect of independent variable in the function have been estimated by using the method of least square. The Cobb-Douglas production function in log form is as follows:

$$\log Y = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + \dots + u \log e$$

Where,

- Y = Value of gross returns of crops (Rs./ha)
- X<sub>1</sub> = Expenditure on human labour (Rs./ha)
- X<sub>2</sub> = Expenditure on seed (Rs./ha)
- X<sub>3</sub> = Expenditure on manures and fertilizers (Rs./ha)
- X<sub>4</sub> = Expenditure on irrigation (Rs./ha)
- a = Intercept

b<sub>j</sub> : (j = 1, 2,.....4) are the elasticity coefficient of the j<sup>th</sup>

**Marginal Value Product (MVP)**

The marginal value of product Inputs were estimated by following formula:

$$(MVP) X_j = b_j \frac{\bar{Y}}{\bar{X}_j}$$

Where,

- b<sub>j</sub> = Production elasticity with respect to X<sub>j</sub>
- Y = Geometric mean of the dependent variable Y
- X<sub>j</sub> = Geometric mean value of X<sub>j</sub>
- MVP = Marginal value product of j<sup>th</sup> input,
- significance test of the simple regression coefficient.

**Research Finding**

The Present Chapter deals with the findings of the present study. The study on the Structure of sample farms & family of significant importance has the resources used patterns, on the farms size of holdings is supposed to positively correlated with volume of food grains production. the former having larger size of holding are economic better of and they are in a position to adopt easily the improved farm practices on the other hand, the farmer having smaller farm unit have been desired to produce as much they can with a view to marketing both their ends meet and also to improve their economic condition shown as Table 1.

**Table 1:** Average size of sample farm by size of farms

S. No.	Size of farm	Number of farms	Total cultivated area (ha)	Average size of farm (ha)
1	Marginal	67	49.58 (44.65)	0.74
2	Small	19	31.73 (28.74)	1.67
3	Medium	14	29.54 (26.61)	2.11
Total		100	110.85	1.11

**Note-** Figures in parenthesis show the per cent to corresponding total

This table indicates that overall average size of farms was found to be 1.11 ha, which varied from 0.74 ha. on marginal, 1.67 ha. on small and 2.11 ha. on medium farms along with total cultivated area 110.85 ha. on sample farms.

**Cost of cultivation of wheat**

Per hectare costs on various input factors in wheat production were worked out. The details of input costs are shown in Table 2.

**Table 2:** Per hectare input cost on different size of sample farm of wheat (Rs./ha)

S. No.	Components of investment	Cost imputed to various components			
		Marginal below 1 ha	Small 1-2 ha	Medium 2-4 ha	Overall average
1.	Human labour	5145.00 (12.11)	4728.00 (11.48)	4439.00 (10.51)	4967.00 (11.77)
a.	Family labour	3893.00 (9.16)	3064.00 (7.44)	2504.00 (5.93)	3541.00 (8.39)
b.	Hired labour	1252.00 (2.95)	1664.00 (4.04)	1935.00 (4.58)	1426.00 (3.38)
2.	Bullock labour	248.00 (0.58)	106.00 (0.26)	76.00 (0.18)	197.00 (0.46)
3.	Machinery charges	4183.00 (9.84)	4315.00 (10.47)	4427.00 (10.48)	4242.00 (10.05)
4.	Seed	1864.00 (4.39)	2072.00 (5.03)	2108.00 (4.99)	1938.00 (4.59)
5.	Manure and fertilizer	4265.00 (10.04)	4128.00 (10.02)	4069.00 (9.63)	4212.00 (9.98)
6.	Irrigation	2186.00 (5.14)	2215.00 (5.38)	2329.00 (5.51)	2211.00 (5.24)
7.	Plant protection	370.00 (0.87)	410.00 (0.99)	435.00 (1.03)	387.00 (0.92)
8.	Total working capital	18261.00 (42.97)	17974.00 (43.63)	17883.00 (42.33)	18154.00 (43.01)
9.	Interest on working capital	320.00 (0.75)	315.00 (0.76)	313.00 (0.74)	318.00 (0.75)
10.	Rental value of land	10500.00 (24.71)	11500.00 (27.92)	14000.00 (33.14)	11180.00 (26.48)
11.	Interest on fixed capital	9545.00 (22.48)	7660.00 (18.60)	6213.00 (14.70)	8727.00 (20.67)
12.	Sub-total	38636.00 (90.91)	37449.00 (90.91)	38409.00 (90.91)	38379.00 (90.91)
13.	10% cost managerial of sub-total	3863.00 (9.09)	3745.00 (9.09)	3841.00 (9.09)	3837.00 (9.09)
14.	Grand total	42499.00 (100.00)	41194.00 (100.00)	42250.00 (100.00)	42216.00 (100.00)

Table 2. indicates that on an average, the cost of cultivation of wheat per hectare came to Rs. 42216.00. The cost of cultivation was maximum on marginal farms (Rs.42499.00) followed by medium farms (Rs. 42499.00) and small farms (Rs. 41194.00).

Per hectare cost of cultivation was highest (42499.00) on marginal farms, mainly due to maximum investment on fixed capital compared to the medium and small farms. On an average the study further reveals that major components on which maximum cost was incurred being 11.77 per cent on human labour followed by machinery charges 10.05 per cent, manures and fertilizer 9.98 per cent, irrigation 5.24 per cent, seed 4.59 per cent, bullock labour 0.46 per cent and plant

protection 0.92 per cent, respectively. A similar trend indicated on all categories of sample farms.

The cost incurred on interest on working capital, rental value of land, interest on fixed capital and 13% managerial cost of sub-total was calculated as 0.75, 26.48, 20.67 and 9.09 per cent of total costs, respectively. The maximum share among these costs was rental value of owned land being 26.48per cent of total cost per hectare.

### Measure of costs and income of wheat

#### Costs of cultivation

Costs and income of wheat production per hectare is given in Table 3.

**Table 3:** Measures of per hectare cost and profit of wheat (Rs. /ha)

S. No.	Particulars	Measure of farm profit			
		Marginal below 1 ha	Small 1-2 ha	Medium 2-4 ha	Overall Average
1.	Cost A <sub>1</sub>	14688.00	15225.00	15692.00	14931.00
2.	Cost B <sub>1</sub>	24243.00	22885.00	21905.00	23658.00
3.	Cost B <sub>2</sub>	34743.00	34385.00	35905.00	34838.00
4.	Cost C <sub>1</sub>	28136.00	25949.00	24409.00	27199.00
5.	Cost C <sub>2</sub>	38636.00	37499.00	38409.00	38388.00
6.	Cost C <sub>3</sub>	42499.00	41194.00	42250.00	42216.00
7.	Product (qt./ha)				
A	Main Product (qt./ha)	32.21	33.05	31.86	32.32
B	By Product (qt./ha)	40.44	41.17	40.29	40.55
8.	Gross Income	54193.00	56028.00	53483.00	54442.00
a.	Main product (qt.)	45094.00	46765.00	44418.00	45317.00
b.	By-product (qt.)	9099.00	9263.00	9065.00	9125.00
9.	Net return over cost C <sub>1</sub>	26057.00	30079.00	29074.00	27243.00
10	Net return over cost C <sub>2</sub>	15557.00	18529.00	15074.00	16054.00
11.	Net income	11694.00	14834.00	11233.00	12226.00
12.	Family labour income	19450.00	21643.00	17578.00	19605.00
13.	Farm investment income	3561200	37739.00	35287.00	35971.00
14	Farm Business Income	39505.00	40803.00	37791.00	39512.00
15.	Cost of production (Rs./q)	1274.00	1205.00	1279.00	1262.00
A	Cost C <sub>1</sub>	1095.00	1035.00	1101.00	1084.00
B	Cost C <sub>2</sub>	179.00	170.00	178.00	177.00
16	Input-Output Ratio				
A	On the basis of cost A <sub>1</sub>	1:3.69	1:3.68	1:3.41	1:3.64
B	On the cost 'B <sub>1</sub> ' basis	1:2.23	1:2.45	1:2.44	1:2.30
C	On the cost 'B <sub>2</sub> ' basis	1:1.56	1:1.63	1:1.49	1:1.56
D	On the cost 'C <sub>1</sub> ' basis	1:1.93	1:2.16	1:2.19	1:2.01
E	On the cost 'C <sub>2</sub> ' basis	1:1.40	1:1.49	1:1.39	1:1.41
F	On the cost 'C <sub>3</sub> ' basis	1:1.27	1:1.36	1:1.29	1:1.29

Note:- Figure in parentheses shows the percent to corresponding total.

Table 3 shows the cost of production and return on marginal small and medium farms of Bharkhani block. Main product of wheat yield was calculated as 32.21, 33.05 and 31.86 quintal and average yield 32.32 quintal per hectare. Gross returns was calculated as maximum in small farms Rs. 56028 followed by marginal farms Rs. 54193.00, medium farms Rs. 53483.00 and observed gross return Rs. 54442.00, net income per hectare over cost a + b + c was found highest in marginal farms Rs. 42499.00 and lowest small farm Rs. 41194.00 and medium farms Rs. 42250.00, net income over cost C<sub>1</sub> small farm is Rs. 30079.00, followed by medium farm Rs.29074.00 and marginal farms Rs. 26057.00 respectively and net return over cost C<sub>2</sub> is highest small farm Rs.18529.00 followed by marginal farms Rs. 15557.00 and medium farms Rs. 15074.00 respectively.

The B.C ratio found highest in wheat crop small farms 1: 1.36 followed by medium farms 1:1.29 and marginal farms 1:1.27 respectively.

### Income from wheat production

Income and farm investment income were worked out to be Rs. 39512.00, Rs. 19605.00 and Rs. 35971.00 per hectare, respectively. Cost of production per quintal of wheat was computed to be Rs. 1274.00, Rs. 1205.00, and 1279.00 on marginal, small and medium farms, respectively.

Ratio (1:1.63) of B<sub>2</sub> was found highest on small farms followed by marginal farms (1:1.56) and medium farms (1:1.49) whereas, in Cost B<sub>1</sub> the input-output ratio was highest on small farms (1:2.45) followed by medium farms (1:2.44) and marginal farms (1:2.23). In respect to cost A<sub>1</sub>, Input-output ratio cost A<sub>1</sub>, was highest on marginal farms (1:3.69) followed by small farms (1:3.68) and medium farms (1:3.41), respectively.

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