Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

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Economics of potato cultivation in Jaunpur and Ghazipur district of eastern Uttar Pradesh

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Abstract
The present study was conducted in Jaunpur and Ghajipur districts of Eastern U.P. District Jaunpur and Ghazipur were purposively selected and the two blocks from each district namely Mariyahun and Bkhsa from Jaunpur districts and from Ghazipur district Zamaniya and Saidpur were selected purposively for the study due to most of the farmers engaged in potato cultivation. List of the villages from selected blocks were prepared along with hectarage under wheat cultivation and 5 villages were selected randomly for study. In all 200 number of farmers were selected proportionally from each category of farmers and classified into three categories i.e. marginal (below 1 ha), small (1-2 ha), large (2 ha & above). The period of enquiry pertain to the agricultural year 2016-17. The primary data were collected from 200 sample respondents (100 small, 70 small and 30 large) through pre-tested interview schedule. The present study has been made to work out the cost of cultivation, profitability and production of potato crop. The cost of cultivation was found to be highest on large farms Rs/ha 85475.25 as compared to small farms Rs/ha 77745.47 and marginal farms Rs/ha 70345.52. The gross income received on an average from potato cultivation was to be Rs/ha 129130.00 per hectare, while gross income was found to be maximum in case of large farms Rs/ha 145872.00 followed by small farms Rs/ha 128238.00 and marginal farms Rs/ha 113280.00. The net income, family labour income, farm business income and farm investment income, on an average basis were found to be Rs/ha 51273.92, Rs/ha 56127.82, Rs/ha 83126.47and Rs/ha 78273.24 per hectare, respectively. The benefit cost ratio was found to 1:1.66 on overall basis. The cost according to different cost concept on overall basis was as fallows, cost A_1, A_2, B_1, B_2, C_1, C_2, C_3 were observed to Rs. 46003.53, Rs. 46003.53, Rs. 59002.18, Rs. 73002.18, Rs. 63855.41, Rs. 77855.41 and Rs. 85640.95 on sample farms respectively.

Keywords: Cost, benefit cost ratio, gross income, family labour income, farm business income, farm investment income

Introduction
Potato (*Solanum tuberosum*) is the most important food crop of the world. Potato is a temperate crop grown under subtropical conditions in India. The potato is a crop which has always been the 'poor man's friend'. Potato is being cultivated in the country for the last more than 300 years. For vegetable purposes it has become one of the most popular crops in this country. In India, potato is generally cultivated on about 2117 '000' ha area with a production of 43417.00 mt (Horticultural Statistics at a Glance, 2017). Uttar Pradesh stands first in area and production of potato. The total production of potato was 15543.00 mt in Uttar Pradesh during year 2016-17.
The area under potato in the district Ghazipur was reported as 8410 hectare with production of 200517 metric tonnes, while productivity was 254.69 q/ha and area, production and productivity in Jaunpur district was 9976 hectare, 176550 metric tonnes and 155.66 q/ha respectively (Shankhyakiya Patrika Janapad Ghazipur and Jaunpur, 2016-17). The study entitled "Economics of potato cultivation in Jaunpur and Ghazipur districts of Eastern Uttar Pradesh" following objective: To work out the cost of cultivation and input: output relationship in production of wheat crop.

Materials and Methods
The research methodology adopted for the present study may broadly be divided under for sub-heads. (1) Sampling techniques, (2) Period of inquiry, (3) Analytical tools and (4) Cost concepts.

Sampling Technique: A multistage sampling technique will be used to select the District, Blocks, Villages and Farmers.

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Two districts namely Jaunpur and Gazipure were selected purposely from Varanasi division of Eastern U.P. A list of all development blocks of the selected district Jaunpur and Gazipur were prepared.

Among the 37 development blocks of Jaunpur and Gazipur, two blocks from each district was selected purposely for the study purpose, because these blocks are highly concentrated on potato production.

A list of all the villages of the selected blocks was prepared with the help of selected block headquarters. Then, 5 villages were selected randomly from each block, thus a total of 20 villages were selected from the four blocks. 10 respondents were selected randomly on the list of farmer engaged in potato cultivation from each village thus a total number of 200 respondents were interviewed on the prepared in advance schedule.

Period of Enquiry: The data was pertained to the agriculture year 2016-2017.

Analytical tools
Tabular analysis: The formula to estimate this average is given below:

Arithmetic mean $= \sum X / n$
The following formula was used for calculating the weighted average of different items.

$$\text{Weighted average} = \frac{W_1X_1 + W_2X_2 + \ldots\ldots + W_nX_n}{W_1 + X_2 + \ldots\ldots + W_n}$$

Where
X_i = Weighted value of an ith item
W_i = Weight of X_1
W_n = N = total weight

Percentage = Simple comparisons have been made on the basis of percentage.

Cost concept Cost A_1 = Value of purchased material inputs (seed, insecticides and pesticides, manure, fertilizer),hired human labour, hired farm machinery, irrigation charges and interest on working capital.
Cost A_2 = Cost A_1 + rent paid for leased-in Land.
Cost B_1 = Cost A_2+ interest on value of owned capital assets (excluding land).
Cost B_2 = Cost B_1+ rental value of owned land (net of land revenue) and rent paid for leased-in land.
Cost C_1 = Cost B_1 + Imputed value of Family Labour.
Cost C_2 = Cost B_2 + Imputed value of Family Labour.
Cost C_3 = 10% of Cost C_2 as managerial cost + cost C_2.

The gross income, net income, family labour income, farm business income, farm investment income, Production per quintal and benefit cost ratio were also worked out using different profitability concepts.

Results and Discussion
Potato is an important crop of the study area. The cost incurred on wheat production on different size group of farms has been worked out in table-1.

The different cost components *viz.* hired human labour, family labour, machine labour, seed cost, plant protection materials, fertilizer, interest on working capital, land revenue, rental value of owned land, depreciation and interest on fixed capital were taken into consideration for the study. The average total cost of cultivation of potato production was workout to Rs. 77855.42, varying from Rs. 70345.22 to Rs. 85475.25 per hectare on different size group of farms. The variation in input cost on farm was due to variation in use of production input, which was found higher on big farms as compared to marginal farms due to more use of inputs like tractor power, fertilizer, seed, irrigation etc. Amongst input items, seed accounted for the highest share of 26.39 per cent followed by human labour 12.13 per cent, manure & fertilizer 11.76 per cent, tractor power 8.65 per cent, and irrigation 3.46 per cent to the total cost, keeping rental value as constant on all size groups of farms.

Table 1: Total cost of cultivation and its brake up of potato (Rs/ha)

Sl. No	Particulars	Size group of farms			Average
		0-1 ha	1-2 ha	2 ha & above	
(A)		Operational cost			
1.	**Human labour**	**7124.98 (10.13)**	**10198.77 (13.12)**	**11012.73 (12.88)**	**9445.49 (12.13)**
a.	Family labour	4631.24 (6.58)	5303.36 (6.82)	4625.09 (5.41)	4853.23 (6.23)
b.	Hired labour	2493.74 (3.54)	4895.11 (6.30)	6387.64 (7.47)	4592.16 (5.90)
2.	Tractor power	5961.23 (8.47)	6564.87 (8.44)	7678.51 (8.98)	6734.87 (8.65)
3.	Manure & Fertilizer	7956.43 (11.31)	8638.59 (11.11)	10867.68 (12.71)	9154.23 (11.76)
4.	Seed	18765.56 (26.68)	20345.87 (26.17)	22532.32 (26.36)	20547.92 (26.39)
5.	Irrigation	2240.67 (3.19)	2896.72 (3.72)	2934.76 (3.43)	2690.72 (3.46)
6.	Plant protection	573.23 (0.81)	735.37 (0.95)	875.26 (1.02)	727.95 (0.94)
7.	Interest on working capital	1329.68 (1.89)	1542.68 (1.98)	1794.66 (2.10)	1555.67 (2.00)
	Total operational cost	43951.78 (62.48)	50922.57 (65.50)	57695.92 (67.50)	50856.76 (65.32)
B.	**Rental value of land**	**14000.00 (19.90)**	**14000.00 (18.01)**	**14000.00 (16.38)**	**14000.00 (17.98)**
C.		Overhead cost			
1.	Interest on fixed capital	6196.87 (8.81)	6411.45 (8.25)	6939.66 (8.12)	6515.99 (8.37)
2.	Repairs of dead stock	3718.12 (5.29)	3846.87 (4.95)	4103.80 (4.80)	3889.60 (5.00)
3.	Depreciation	2478.75 (3.52)	2564.58 (3.30)	2735.87 (3.20)	2593.07 (3.33)
	Total over head cost	12393.74 (17.62)	12822.90 (16.49)	13779.33 (16.12)	12998.66 (16.70)
	Total cost	70345.52 (100.00)	77745.47 (100.00)	85475.25 (100.00)	77855.42 (100.00)

(Figures in bracket shows the percentage of respective value)

Yield and cost of production

Table 2: Total returns received from potato (Rs/ha)

Sl. No.	Particulars	Size group of farms			Average
		0-1 ha	1-2 ha	2 ha & above	
1.	Input cost	70345.52	77745.47	85475.25	77855.42
2.	Total yield in q/ha	188.80	213.73	243.12	215.22
3.	Rate of potato (in Rs/q)	600.00	600.00	600.00	600.00
4.	Gross Income	113280.00	128238.00	145872.00	129130.00
5.	Net Income	42934.48	50490.53	60396.75	51273.92
6.	Cost of production/q	372.59	363.75	351.58	362.64
7.	Input-output ratio	1:1.61	1:1.65	1:1.71	1:1.66

As regards to the income structure from wheat cultivation at different size group of farms were concerned in the study area, it is observed from the table 2 that an overall, farmer gained yield of 215.22 q/ hectare, which gave an average gross income of Rs. 129130.00 and net income of Rs. 51273.92 per hectare however, the net income varied from Rs. 42934.48 on marginal farms to Rs. 60396.75 on large farms due to variation in yields, which was due to variations in use of production input. The higher use of production inputs and better management of the large farms resulted in higher yield and income of their farms. The average cost of production per quintal came to Rs. 362.64 which varies from Rs. 372.59 on marginal farms to Rs. 351.58 on large farms; the cost of production per quintal was higher on marginal farms due to poor management, awareness and improper use of resources. The input-output ratio was higher on large farms (1:1.71) fallowed by small farms (1:1.65) and marginal farms (1:1.61).

Cost concept
Table 3 revealed that the cost of cultivation of wheat was estimated under various cost concepts like as Cost A1, Cost A2, Cost B1, Cost B2, Cost C1, Cost C2 and Cost C3. Table-3 portrays that average cost A_1, A_2, B_1, B_2, C1, C2, C_3 were observed Rs. 46003.53, Rs. 46003.53, Rs. 59002.18, Rs. 73002.18, Rs. 63855.41, Rs. 77855.41 and Rs. 85640.95 on

sample farms respectively. The cost C_3 was observed to be higher on large farms as Rs 94022.77 fallowed by Rs 85520.02 on small farms and Rs 77380.07 on marginal farms.

Table 3: Total cost according to different cost concept in potato cultivation (Rs/ha)

Sl. No.	Particulars	Size group of farms			Average
		0-1 ha	1-2 ha	2 ha & above	
1	Cost A_1	39320.54	45619.21	53070.83	46003.53
2	Cost A_2	39320.54	45619.21	53070.83	46003.53
3	Cost B_1	51714.28	58442.11	66850.16	59002.18
4	Cost B_2	65714.28	72442.11	80850.16	73002.18
5	Cost C_1	56345.52	63745.47	71475.25	63855.41
6	Cost C_2	70345.52	77745.47	85475.25	77855.41
7	Cost C_3	77380.07	85520.02	94022.77	85640.95

Income measures approach
Income measures approach is a crucial total of estimating the degree of farm business achievements. It guides to farmers about success of farm enterprises, efficiency and productivity of resources. It is also helpful in decision making, organization and separation of the farms income as a gross income, Net income, family labour income, farm business income, and farm investment income are the key components of income measures approach.

Table 4: Size group wise gross income, net income, family labour income, farm business income and farm investment income (Rs/ha)

Sl. No.	Particulars	Size group of farms			Average
		0-1 ha	1-2 ha	2 ha & above	
1	Gross income	113280.00	128238.00	145872.00	129130.00
2	Net income	42934.48	50490.53	60396.75	51273.92
3	Family labour income	47565.72	55795.89	65021.84	56127.82
4	Farm business income	73959.46	82618.79	92801.17	83126.47
5	Farm investment income	69328.22	77315.43	88176.08	78273.24

Table-4 reveals that the average family labour income, farm business income and farm investment income of farms were Rs. 56127.82, Rs. 83126.47 and Rs. 78273.24 respectively however; family labour income varied from Rs. 47565.72 on marginal farms to Rs. 65021.84on large farms. The farm business income was higher on large farms as Rs 92801.17 fallowed by Rs 82618.79 on small farms and Rs 73959.46 on marginal farms.

Conclusion
It is concluded that the cost of potato cultivation as quoted earlier, cost C3 was noted highest in case of large farms (94022.77 Rs/ha) followed by small farms (85520.02 Rs/ha) and marginal farms (77380.07 Rs/ha) in which cost A1 was also found highest on large farms (53070.83 Rs/ha) in comparison to small farms (45619.21 Rs/ha) and marginal farms (39320.54 Rs/ha). The productivity was to be found

highest in case of large farms (243.12 q/ha) as compared to small farms (213.73 q/ha) and marginal farms (188.80 q/ha). The gross income was observed highest from the cultivation of wheat on large farms (145872.00 Rs/ha) as compared to small farms (128238.00 Rs/ha) and marginal farms (113280.00 Rs/ha). The net income, farm business income and farm investment income was noticed high on large farms as compared to medium and small farms while benefit cost ration was found to be highest in case of large farms (1:1.71) followed by small farms (1:1.65) and marginal farms (1:1.61).

References
1. Peer QJA, Ahmad N, Kaur J, Chesti MH, Shabir H Ahmad, Bhat A *et al*. Study on economics of potato growing towards livelihood security Afr. J. Agric. Res. 2013; 8(45):5639-5644, 21.

2. Lama M, Bordoloi R. Potato Productivity and its Determinants: A Case Study in Sonitpur District, Assam" Social Change and Development, 2017, VOL 14.

3. Subedi S, Ghimire YN, Gautam S, Poudel HK, Shrestha J. Economics of potato (*Solanum tuberosum* L.) production in terai region of Nepal. Archives of Agriculture and Environmental Science. 2019; 4(1):57-62.

4. Ghulghule JN, Asmatoddin Mohd, Thombre AP, Birajdar KA. An economic analysis of potato cultivation in Latur district of Maharashtra. International Journal of Commerce and Business Management, 2009; 2(1):12-14.

5. Osipov V, Zhevora S, Yanushkina N. Efficiency of potato production: analysis of variation and differentiation of regions of the Russian Federation IOP Conf. Series: Earth and Environmental Science, 2019; 274(2019):012060.

6. Perka SK, Vasudev N. Socio-Economic Study of Potato Farmers in Medak District of Telangana State". Journal of Agricultural Engineering and Food Technology p-ISSN: 2350-0085; e-ISSN: 2350-0263. 2016; 3(2):109-112.

7. Venyo Vengoto, Sharma A. Economics and Constraint of Potato crop in Kohima District of Nagaland. A Journal of Multidisciplinary Advance Research. 2018; 7(1):75-80.