A study on costs and returns of potato in Azamgarh district of Eastern Uttar Pradesh, India

ABSTRACT

Potato is the most important food crop of India after rice and wheat. It has always been the 'poor man's friend. Potato is an economical food and rich source of energy. The total potato produce in the world was 376.82 million tonnes from 18.33 million hectare of area. Both the area and production of potato has increased manifold during the past decades. India produced nearly 36.28 million tonnes of potato from 1.82 million hectare. In Uttar Pradesh potato is grown in 564.3hectares with a production of 13808 million tonnes and productivity of 24.5 million tonnes per hectare. The study conducted pawai block of Azamgarhdistrict.The study showed that an overall farms i.e.1.553 ha and cropping intensity i.e. 217.92 per cent as exhibiting inverse relationship with the size of form.Perfarm average investment on overall farm came to Rs.242208.79 and maximum share was under the head of building i.e. 57.00 per cent followed by farm machinery and livestock share. The overall average cost of cultivation (C_3) per hectare was Rs. 78154.62 and gross income came to Rs. 123527.20, which offers a net income of Rs. 45372.50.

Keyword: Potato production, land holding size,croppingpattern,croppingintensity,cost of production,cost and income measure.

Introduction

Potato (*Solanumtuberosum L.*) belongs to family Solanaceae well known as the king of vegetable has emerged as the most important food crop of India. Potato acclaimed around globe as the power house of energy. It is the world's third most important food crop after wheat and rice with a production of 376.82 million tonnes fresh weight produced from 18.33 million hectare area (2016-17).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 the most popular crop in this country. (Source: FAOSTAT,2018).

Potato is an economical food; it provides a source of energy to the human diet. Potato is a rich source of starch vitamins especially C and B and minerals. It contains 20.6 per cent carbohydrate, 2.1per cent protein, 0.3 per cent fat, 1.1 per cent crude fiber and 0.9 per cent ash. Potato also contains a good amount of essential amino acid like Lucien, tryptophan and isoleucine etc. Due to high protein calories ratio (17 gm protein:1000k calories) and short vegetable cycle potato yields substantially more edible energy protein and dry matter per unit area and time than many other crops . Both area and production has increased manifold during the past decades. Yet, the country still cannot absorb excess potato production mainly due to lack of required infrastructure for storage, transport, marketing and utilization. India produced nearly 36.28 million tones of potato from 1.82 million hectare, and is projected to double by 2020 (Agricultural Statistics at a glance 2014).

Major portion of the requirement of vegetable is covered by potato crop and its production has been increasing every year. Most of the farmer likes to grow the potato crop because of its high profitability; as a result, the area of potato crop is increasing rapidly. The demand of potato is too much high than the other vegetable. The role of potato is more significant in the total farm production of India. It gives more employment to the people in comparison to other vegetable crops and its export in big quantity also helps to increase national income.India ranks 4th in area and is the 3rd largest country in the world after China and Russian Federation in the production of potato. However, potato productivity in India (19.93 tons per hectare) is comparatively very low as compared to Belgium (49.09 t/ha.) and New Zealand (45.0 t/ha.). This may be due to the fact that wide ranging variation are found in agro ecological setting of the different parts of the country (Agricultural statistics at a Glance 2009).In Utter Pradesh potato is grown in 5.05 lakh ha. with a production of 11.1 million tones. It plays an important role in the states economy and wellbeing of the farmers. Although potato productivity in the state ranks 3rd next to Gujrat and West Bengal, there is still a wide gap between the actual (21-27 t/ha.) and potential yields (40-45 t/ha.).

In Azamgarh district of eastern Uttar Pradesh potato occupies an area of 4744 hectares and its productivity was 298.62 q/ha. The total production was 47122 million tonnes. (District statistical bulletin 20014-15). In the light of vital importance of production of potato consumption among majority of population and having commercial production in the context of farmers consideration keeping in their cropping sequence the present study entitled.

Explored with following objectives:

(i) to study cropping pattern and cropping intensity and

(ii) to workout cost and returns of potato by size of farms.

Methodology:

1. Sampling design: Purposive cum Random sampling design was used for the selection of district, block, villages and respondents.

Selection of block: Out of 22 blocks of selected district, Pawai block was selected randomly for the study.

Selection of villages: A list of all villages of selected block was prepared separately along with their area under potato cultivation. Five villages 1.Saraipul, 2.Khairuddinpur, 3.Bagbahar, 4.Dhudhuri, 5.Bhukhali were selected randomly.

Selection of farmers: A separate lists of Potato growers of selected villages was prepared along with their size of holding and further it was grouped into three categories i.e. **1.**Marginal farmer (below 1ha) **2.**Small farmer (1-2 ha), and **3.**Medium farmer (2-4ha). Finally, 100 Potato growers were selected randomly in proportion to their number of universe in each size groups.

2. Method of enquiry: The primary data were collected by survey method through personal interview on well structured and pre tested schedule, while secondary data were collected from books, journals, report and records of the district and block headquarters.

3.Data collection: Primary data was collected through personal interview, pre structured and pre-tested schedule. Secondary data was taken from the official records available at block, tehsil, and district offices.

4. Period of study: The data pertained for the agricultural year 2016-17.

5. Analysis of data: Tabular and functional analysis was used. Weighted average was worked out for interpretation of data.

$$\text{Weighted Avergae} = \frac{\sum W_i X_i}{\sum W_i}$$

Where, X_i =variable W_i =Weights of variable

Cropping intensity (C.I.):

$$C.I. = \frac{\text{Total crooped area}}{\text{Net cultivated area}} \times 100$$

Where, C. I. = cropping intensity

Results and Discussion

1: Average size of holding of sample farmers: Average size of holding on various group of sample farms are presented in **Table1**. It is evident from of the table that the average size of holding exhibited i.e. 0.698, 1.519 and 3.382 hectare on marginal, small and medium farms respectively with an overall average i.e. 1.553 hectare. Out of total cultivated area at sample farms, 33.51, 44.06 and 77.79 per cent falls under marginal, small and medium farms categories respectively with showing increasing with increasing in size of farms.

Table 1: Average size of holding on sample farms under different size group of farms (in ha)

S. N.	Size group of farm	No. of sample farm	Total cultivated area	Average size of holding
1.	Marginal (below-1ha)	48	33.51	0.698
2.	Small (1-2ha)	29	44.06	1.519
3.	Medium (2-4ha)	23	77.79	3.382
Total		100	155.36	1.553

2: Cropping pattern: A cropping pattern is the proportion of area under different crops at a point of time. It thus differ from a crop rotation in the sense that it does not denote succession of crop in a field over time as rotation placed.

The area allocated to different crops under various seasons are presented in **Table-2.** It is seen from the table that among the cereals rice, wheat and potato have substantial area and became a major cereals crops. As it cover 31.89, 22.54 and 16.33 per cent of the total cropped area. Other important crops included in the cropping pattern were bajra in kharif (3.66%) sugarcane in rabi (2.82%). In zaidmung and urd were given much importance by the sample farmers.Potato was found most prominent crop of the study area as it was allocated 16.33 per cent of total cropped area. It may be concluded that paddy, wheat and potato were considered as main food crop having 1st, 2nd and 3rd place in cropping pattern.

Table2: Cropping pattern on sample farms under different size group of farms (in ha)

S. No.	Crop grown under Different season	Size group of farms			
		Marginal	**Small**	**Medium**	**Overall average**
a.	**Kharif**	0.698 (44.88)	1.519 (45.51)	3.382 (47.02)	1.553 (46.12)
1.	Paddy	0.611 (39.29)	1.01 (30.26)	2.122 (29.50)	1.074 (31.89)
2.	Maize	0.015 (0.96)	0.274 (8.21)	0.581 (8.07)	0.285 (8.46)
3.	Arhar	0.015 (0.96)	0.051 (1.52)	0.273 (3.79)	0.847 (25.15)
4.	Bajra	0.057 (3.66)	0.184 (5.51)	0.406 (5.64)	0.174 (5.16)
b.	**Rabi**	0.683 (43.92)	1.468 (43.99)	3.109 (43.22)	1.468 (43.59)
1.	Potato	0.242 (15.56)	0.512 (15.34)	1.245 (17.31)	0.550 (16.33)
2.	Wheat	0.370 (23.79)	0.743 (22.26)	1.593 (22.14)	0.759 (22.54)
3.	Mustard	0.026 (1.67)	0.088 (2.63)	0.110 (1.52)	0.063 (1.87)
4.	Onion	0.001 (0.06)	0.037 (1.10)	0.051 (0.70)	0.022 (0.65)
5.	Sugarcane	0.044 (2.82)	0.088 (2.63)	0.110 (1.52)	0.071 (2.10)
c.	**Zaid**	0.174	0.350	0.701	0.346

		(11.18)	(10.48)	(9.74)	(10.27)
1.	Urd	0.016 (1.02)	0.022 (0.65)	0.105 (1.45)	0.038 (1.12)
2.	Mung	0.052 (3.34)	0.075 (2.24)	0.101 (1.40)	0.069 (2.04)
3.	Chari	0.100 (6.43)	0.240 (7.19)	0.362 (5.03)	0.200 (5.94)
4.	Vegetable	0.006 (0.38)	0.013 (0.38)	0.133 (1.84)	0.037 (1.09)
Total (a+b+c)		1.555 (100)	3.337 (100)	7.192 (100)	3.367 (100)

Note: Figures in parentheses indicate percentage to the total.

1.3: Cropping intensity: Cropping intensity is an index of intensity of land use determined by the number of crops grown in a particular field, during a year. It has been computed for all size groups of farms and is presented in **Table-3.**

Table 3: Cropping intensity on different size of sample farms.

S. N.	Size group of Farms	Net cultivated area (ha)	Gross cropped Area (ha)	Cropping intensity (%)
1.	Marginal	0.698	1.555	222.78
2.	Small	1.519	3.337	213.68
3.	Medium	3.382	7.192	212.65
Average		1.553	3.367	217.92

Note: Figures in parentheses indicate percentage to the total.

The maximum cropping intensity observed was 222.78 % on marginal farms followed by small 213.68% and medium 212.65% size group with an overall farm i.e. 217.92 per cent. Higher cropping intensity on marginal size of farms shows the awareness of marginal farmer regarding expecting more profit by utilizing sizeable area of land.

Table4: Cost of cultivation of potato: Per hectare costs on various input factors in potato cultivation was worked out and breakup are presented in the **Table 4**. The cost of cultivation

was observed higher on marginal farms as Rs.75886.53 followed by small farms Rs.79847.31 and medium farms Rs. 80753.77 respectively with an overall average i.e.Rs. 78154.62

The study further indicates that the cost on overall average showed the maximum expenditure on total human labour i.e. 34.460 per cent followed by the expenditure on seed 18.27, manure & fertilizer, irrigation and machinery charge corresponding to 8.62, 10.39, and 6.67, per cent respectively. It is concluded from the data that costs of cultivation of potato had the negative relationship with the size of farms. Highest cost of cultivation on marginal size of farms as compared to small and medium size of farm occurred due to heavy expenditure on human labour and interest on fixed capital.

Table 4: Per hectare costs of different inputs used in potato cultivation (in Rs.)

S. N.	Particulars	Marginal (48)	Small (29)	Medium (23)	Overall average
1.	Seed	13869.71 (18.27)	16889.00 (21.15)	17066.66 (21.13)	15480.60 (19.80)
2.	Manure & fertilizer	6544.83 (8.62)	7816.30 (9.78)	8038.87 (9.95)	7257.18 (9.28)
3.	Plant Protection	474.89 (0.62)	574.28 (0.71)	611.11 (0.75)	535.04 (0.68)
4.	Irrigation	7886.10 (10.39)	7965.30 (9.97)	7933.33 (9.82)	7919.93 (10.13)
5.	Family labour	14909.40 (19.64)	13012.00 (16.29)	10222.22 (12.65)	13281.10 (16.99)
6.	Hired labour	13354.61 (17.59)	13322.44 (16.68)	16444.44 (20.36)	14055.94 (17.98)
7.	Total human labour	28264.01 (37.24)	26334.68 (32.98)	26666.66 (33.02)	27377.11 (34.97)
8.	Machinery power	5064.71 (6.67)	6040.81 (7.56)	6088.88 (7.54)	5583.33 (7.14)
9.	Total working capital	47194.85 (62.19)	52608.69 (65.88)	56183.29 (69.57)	50832.04 (65.04)
10.	Interest on working capital	235.96 (0.31)	263.04 (0.32)	280.91 (0.34)	254.15 (0.32)
11.	Rental value of owned land	6000 (7.90)	6000 (7.51)	6000 (7.42)	6000 (7.67)
12.	Interest of fixed capital	647.54 (0.85)	705.30 (0.88)	726.68 (0.89)	682.35 (0.87)
13.	Sub total	68987.76	72588.47	73412.52	71049.66

		(90.90)	(90.90)	(90.90)	(90.90)
14.	Managerial Cost @ 10% of sub-total	6898.77 (9.09)	7258.69 (9.09)	7341.25 (9.09)	7104.96 (9.09)
Grand total		75886.53 (100)	79847.31 (100)	80753.77 (100)	78154.62 (100)

Note: Figures in parentheses indicate percentage to the total.

1.5: Measure of cost and return of potato crop in study area:

Per hectare costs and income from the cultivation of potato crop on different categories of farm were worked out and presented in **Table.5.**

Per hectare cost "C_3" was worked out to be Rs.75886.53 on marginal, Rs. 79847.31 on small and Rs.80753.77 on medium farms with an over all average of Rs.78154.62 respectively.This was because of the fact that use of variable inputs and investment cost comparatively decreased with the increase in farm size.Per hectare gross income came to Rs. 123527.20 on overall average of farms. Per hectare gross income was maximum on small farms that was Rs. 125325.00 followed medium and marginal size group of farms i.e. Rs.122750.00 and Rs. 120750.00 respectively. On an average net income, family labour income and farm business income were worked out to Rs.45372.50, Rs.65758.60 and Rs.72440.40 per ha respectively.Input-out ratio on marginal, small and medium farms was 1.65, 1.53, and 1.49 on Cost C_3. In respect of overall average of farm, input-output ratio were 2.42, 2.39, 2.14, 1.89, 1.73 and 1.57 on basis of Cost A_1/A_2, B_1, B_2, C_1, C_2 and cost C_3 respectively.

It may be concluded that input-output ratio had the positive relationship with size of farms.

Table5: Measures of form profit of potato crop by size of farm. (Rs. /ha.)

S.N.	Particulars	Marginal	Small	Medium	Overall average
1.	Cost A1/A2	47430.81	52871.17	56464.20	51086.19
2.	Cost B1	48078.35	53576.47	57190.30	51768.55
3.	Cost B2	54078.35	59576.47	63190.30	57768.55
4.	Cost C1	62987.75	66588.47	67412.52	65049.66
5.	Cost C2	68987.75	72588.47	73412.52	71049.66
6.	Cost C3	75886.53	79847.31	80753.77	78154.62
7.	Gross income	125325.00	122750.00	120755.00	123527.20
8.	Net income	49438.42	42902.69	40001.23	45372.50
9.	Family labour income	71246.65	63173.53	57564.70	65758.60
10.	Farm business income	77894.19	69878.83	64290.80	72440.96
11.	Yield (q.)	250.65	245.50	241.51	247.05
12.	Input- output ratio				
a.	On the basis of cost A1/A2 basis	1:2.64	1:2.32	1:2.13	1:2.42
b.	On the basis of cost	1:2.60	1:2.29	1:2.11	1:2.39

	B1				
c.	On the basis of cost B2	1:2.31	1:2.06	1:1.91	1:2.14
d.	On the basis of cost C1	1:1.98	1:1.84	1:1.79	1:1.89
e.	On the basis of cost C2	1:1.81	1:1.69	1:1.64	1:1.73
f.	On the basis of cost c3	1:1.65	1:1.53	1:1.49	1:1.57

Summary and Conclusion:

An overall average size group of holding in the study area was found to 1.553 hectare and cropping intensity was 217.92 per cent. Cropping intensity showed inverse relation with size of holding. Per farm total investment on sample farms were mainly shared by the building (57.00%) followed by farm machinery (24.10%) and livestock (18.89%). Farm investment on building and farm machinery had direct relationship with farm size which constituted 57.00, 24.10 and per hectare total investment on marginal farms constitute 18.89 per cent which had inverse relationship on the sample farms. In the cropping pattern paddy, wheat and potato had substantial area i.e.31.89, 22.54 and 16.33 per cent of the gross cropped area. Other important crops in cropping pattern were maize, arhar, bajra, mustard and onion, sugarcane, urd, moongchari, vegetable. Average per hectare cost of cultivation came to Rs. 78154.62 It was higher on marginal farms (Rs.75886.53) followed by small (Rs.79847.31) and medium i.e. Rs. 80753.77 respectively. Rise in per hectare cost in marginal category of farms was noticed due to heavy expenditure on total human labour and other inputs. The total cost of cultivation was constituted by 33.74% of total human labour followed by seed 19.80, manure and fertilizer and rental value of land, irrigation, machinery charges chemicals & plant protection corresponding to 9.28, 7.67, 10.13, 7.14 and 0.68 per cent respectively.Per hectare gross income came to Rs. 123527.20 on average farms. It was maximum on small farms than that of medium farms and marginal farms. On an average net income, family labour income and farm business income, input-output ratio (C_3 basis)were worked out to Rs.45372.50, Rs.65758.60, Rs.72440.96 and 1:1.57 respectively.

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