

## Original Research Article

# Profitability of Tomato (*Lycopersicon esculentum*) Production in some Selected Areas in Panna District of Madhya Pradesh

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## ABSTRACT

A study was conducted to analyse the profitability, contribution of factors in yield and socioeconomic status of tomato producing farmers in panna district of Madhya Pradesh” was undertaken with a view to estimate the costs and returns and constraints in tomato production .A sample of 60 tomato growers comprises 20 farmers each from three groups viz. small, medium and large were selected using simple random sampling techniques from producing villages selected from Panna block of Panna district. The required primary data viz. costs and return, constraints in tomato production were collected with the help of pretested interview schedule The benefit cost ratio was higher in the case of small size group 1:2.11 (maximum) followed by 1:1.83 in medium and 1:1.68 (minimum) in large size group. It can be concluded that net return over cost  $A_1/A_2$  and net return on cost  $C_3$  was comparatively higher in small size farm. There were many problems related to production observed. Mainly constraints of production included high cost of quality seed, lack of labour, costly irrigation, lack of capital and lack of knowledge

### Keywords

Host farmers,  
Cost  $A_1/A_2$  and  
 $C_3$  profitability,  
Benefit cost  
ratio (BCR)

## Introduction

Tomato (*Lycopersicon esculentum*. L) is an important short duration solanaceous vegetables crop grown worldwide under both Rabi and Kharif season, USA, Italy, Turkey, and Egypt. Total cultivated area under tomato is 45, 82,438 thousand ha. with production of 15051381 thousand tones and productivity of 32.8 tones/ha.in the world (year 2014-15 FAOSTAT). Tomato is one of the most important vegetable crops cultivated for its fleshy. India ranks second in the area as well as in production of tomato. The major tomato growing countries are China, India.

The total cultivated area of tomato in India is about 767.32 thousand ha. with total

production 16,384.98 thousand MT (NHB Database; 2014-15). India shares in the world tomato production about 11% in the year (2014-15).

Madhya Pradesh is the largest tomato producing state occupying the 70.23 lakh ha.ofwith 2177.00 MT production (2014-15). The second largest tomato producing state in India is Karnataka having production area of 64.25 lakh ha. with a production 2034.37 MT (2014-15), Andhra Pradesh state has third rank in tomato area and production. Respectively in the area 54.22 lakh ha. and production 1473.54 MT (NHB; 2014-15). Panna District is situated in the North Eastern part of state of Madhya

Pradesh in India and the Administration centre of Sagar division. Tomato crop is very important in profitability point of view and also covers about one fourth area of vegetable crop in Panna District. Panna district has 1563 ha, area under tomato cultivation with a production and productivity of 43.54 MT and 10.15 T/ha (NHB; 2014-15). Panna block has 390.00 ha area under tomato crop with 21.10 Tones production and productivity 10.15 tons/ha (NHB; 2014-15). The main purpose of this study is to evaluate the efficiency with which the farmers in Panna district use their resource in the cultivation of tomato crop and resultant more economic returns against general crop production. The result of profitability and cost efficiency in tomato production with different size level and use of production technology will indicate the scope existed to increase their area, production and productivity also with judicious use of scarce and important inputs. The present study has been undertaken to identify the socioeconomic profile; to analyze the profitability of tomato production; and to determine the factors affecting yield and income. It is expected that the findings of the study will be helpful for the commercial tomato farmers as well as policy makers to expand the cultivated area in respect of increasing domestic demand.

### **Materials and Methods**

This section discusses about the selection of the area, period of the study, sampling technique and sample size, preparation of the interview schedule and data processing and analysis.

### **Sample technique and source of data**

Both descriptive and statistical techniques were used in the present study. Descriptive

techniques such as frequency distribution, percentages, summation, etc. were used to analyze the socioeconomic characteristics and constraints associated with tomato farmers. The study was conducted in Panna block of Panna district in Madhya Pradesh. Panna district was selected purposively due to more acreage under tomato cultivation and convenience as well as well acquaintance of researcher. A multi-stage sampling technique was applied to select the sample farmers. After selection of the villages, a list of tomato growing farmers was prepared and further categorized into three groups on the basis of size of land holding i.e., Small (up to 2 ha), Medium (2 to 4 ha), and Large (more than 4 ha). From each group 20 farmers was selected randomly for detail investigation and finally 60 tomato growers were selected randomly for the study purpose.

### **Analytical technique**

The items of cost of cultivation cover both paid out cost (out of pocket expenses cash + kind) and the imputed costs. The sum of fixed and variable costs make total cost for producing per hectare crop or per unit /number of livestock. Operational cost are the expenses related to the costs of running a business operations. Cost of production (Rs/q), total production(Main product + By product) and Gross income (Value of main product + Value of by product) were worked out for different size groups.

**Cost A<sub>1</sub>:** All actual expenses in cash and kind incurred in production by owner operator.

**Cost A<sub>2</sub>:** Cost A<sub>1</sub> + rent paid for leased land.

**Cost B<sub>1</sub>:** Cost A<sub>2</sub> + interest on value of owned fixed capital assets (excluding land)

**Cost B<sub>2</sub>:** Cost B<sub>1</sub> + rental value of owned land.

**Cost C<sub>1</sub>:** Cost B<sub>1</sub> + imputed value of family labour.

**Cost C<sub>2</sub>:** Cost B<sub>2</sub> + imputed value of family labour.

**Cost C<sub>3</sub>:** Cost C<sub>2</sub> + 10 percent of cost C<sub>2</sub> to account for managerial input of the farmer.

Cost C<sub>3</sub> is more comprehensive and represents the total cost of cultivation. It is very important when farming is considered to be strictly commercial preposition.

$$\text{B.C.R.} = \frac{\text{Gross income}}{\text{Total cost}}$$

## Results and Discussion

The socioeconomic with a set of variables and then the results of costs, returns and profitability of tomato and finally the effect of influencing factors on economic return of tomato production are presented in the following sub-section

### Socio economic status of tomato farmers

Socio economic characteristics of farmers is one of the most important independent variable which directly or indirectly influence the level of adoption of improved tomato production technology which ultimately changed the production level and profitability per unit of production area. In present study the socio economic characteristics of tomato growers included the age, education, and caste and educational level. The detail information of socio economic characteristics is presented in following statements.

As evident from the data presented in table 2 it appears that on an average the tomato growers were 45 years of age. As per the size of holding, in small size group the average age of tomato growers was 43 years while in medium size, the average age of

tomato growers was 46 years and in large size group the average age of tomato growers was found to be 45 years. It was due to fact that the elder farmers fragmented their holding into small due to distribution of holding among the spouses.

The study shows that majority of the tomato growers were literate (70.00%). The literacy position reflected that among the total tomato growers the majority of the tomato growers had an education of primary level (25.00%) followed by middle school (23.33%), higher secondary standard (15.00%) and college level (6.67%) respectively. It is also apparent that (30.00%) of the tomato growers were illiterate and got formal education.

Table 1 indicated that off the total sample (60) majority of the respondent and belonged to other backward caste (45.00) followed by general category (10) Scheduled tribe and scheduled caste farmers were 3.00 and 2.00 respectively. This shows that in the study are basically agriculture is in the hard of their backward classes and general category farmers (more than 90 %).

Table 7 shows that the family labour was maximum used in small size (80 days) followed by large size (70 days) and medium size (60 days). Hired human labour was maximum used in medium size of farm 111 days, 60 days and 83 (small, and large). Total human labour days employment was maximum in medium size (171 days) followed by large (153 days) and small size (140 days), respectively. Machine power cost was maximum in large size (Rs. 8211) followed by medium (Rs. 6573) and small size (Rs. 7203), respectively. Seed cost was maximum in small size (Rs.12256) followed by medium size (Rs. 12237) and large size (Rs. 12218), respectively. Plant protection charges was maximum in medium size (Rs.

2391) followed by large size (Rs. 2349) and small size (Rs. 2246), respectively. Manures & fertilizers cost was maximum in large size (Rs. 13341) followed by medium size (Rs. 12310) and small size (Rs. 11768), respectively. Irrigation charge was maximum in large size (Rs. 8669) followed by medium size (Rs. 8516) and small size (Rs. 8010) group, respectively. On the basis of above observation the conclusion is that small size farm on human labour was a result of sufficient availability of family labour.

Table 3 shows that the Hired human labour cost in the form of wage was substantially higher in medium size farm Rs. 22200 (maximum) and Rs. 12000 in small size (minimum) and large size farm Rs. 16600. Land revenue was same in small, medium and large size (Rs. 12.00).

Table 4 shows that the operational cost known as cost  $A_1$  &  $A_2$  accounted for Rs. 60537.60 in small size followed by Rs. 72417.95 in medium size and Rs. 70368.20 in large farm size. Cost  $B_1$  a sum of cost  $A_1$  and interest on fixed capital amounted for Rs. 62090.60 in small size, Rs. 74265.95 in medium and Rs. 72422.20 in large size group. Cost  $B_2$  a sum of cost  $B_1$  and rental value of own land amounted for Rs. 86263.10 in small size, Rs. 102965.95 in

medium and Rs. 110902.87 in large size group. The cost  $C_1$  and  $C_2$  was found maximum in large size farm (Rs.86422.20 and 124902.87) and  $C_1$  and  $C_2$  minimum in small size (Rs. 78090.60 and Rs.102263.10) and  $C_1$  large size farm (Rs. 86422.20) and  $C_2$  medium size farm was found (Rs. 114965.94) respectively. Cost  $C_3$  known as total cost per hectare accounted for Rs. 112489.41, 126462.54 and 137393.15 small, medium and large size groups respectively.

Table 5 shows that the productivity of tomato in term of yield per hectare was small size group 383 q/ha followed by 381 q/ha and 394 q/ha in medium and large size farm, respectively. Gross income a sum of yield multiplied by unit price of tomato had also denoted in the same pattern as followed in productivity. In small size group the obtained gross income was Rs. 237460 medium size group the gross income was Rs. 232410 in medium size and Rs. 230884 in large size. On the basis of various costs as observe in input wise cost Table as per their cost concept net return per hectare recorded in the order of Rs. 124970.59 for small size Rs. 105947.46 in medium size and Rs. 93490.85 in large size. The benefit cost ratio was higher in the case of small size group 1:2.11 (maximum) followed by 1:1.83 in medium and 1:1.68 (minimum) in large size group.

**Table.1** Caste wise distributions of selected respondents

S.No.	Caste group	Category			Total
		Small	Medium	Large	
1.	SC	01.00(5.00)	01.00(5.00)	0.00(0.00)	<b>02(3.33)</b>
2.	ST	01.00(5.00)	01.00(5.00)	01.00(5.00)	<b>03(5.00)</b>
3.	OBC	16.00(80.00)	13.00(65.00)	16.00(80.00)	<b>45.00(75.00)</b>
4.	General	02(10.00)	05(25.00)	03(15.00)	<b>10.00(16.67)</b>
<b>Total</b>		<b>20 (100)</b>	<b>20 (100)</b>	<b>20(100)</b>	<b>60 (100)</b>

(Figures in parentheses indicate the percentage to total)

**Table.2** Age and education levels of sample tomato growers  
(No. of tomato growers)

S. No.	Characteristics	Size of holding			
		Small	Medium	Large	Overall
1.	Average age (In year)	43	46	45	45
<b>Education</b>					
1.	Illiterate and formal education	3 (15)	9 (45)	6 (30)	18 (30.00)
2.	Up to primary (5 <sup>th</sup> standard)	7 (35)	2 (10)	6 (30)	15 (25.00)
3.	Up to middle (8 <sup>th</sup> standard)	6 (30)	3 (15)	5 (25)	14 (23.33)
4.	Up to H.S.S.C. (12 <sup>th</sup> standard)	2 (10)	5 (25)	2 (10)	9 (15.00)
5.	Graduate and above	2 (10)	1 (5)	1 (5)	4 (6.67)
	<b>Total</b>	<b>20(100.00)</b>	<b>20(100.00)</b>	<b>20(100.00)</b>	<b>60(100)</b>

(Figures in parentheses indicate the percentage to total)

**Table.3** Breakup of cost of cultivation of tomato under different size of farms  
(unit-ha)

S.No.	Cost item	Small	Medium	Large	Average
<b>A.</b>	<b>Labour cost</b>				
1.	Value of family labour	16000	12000	14000	14000.00
2.	Value of hired human labour	12000	22200	16600	16933.34
3.	Charges of machine(H+ O)	7203	6573	8211	7329.00
4.	Other variable cost	1869	2192	2276	2112.33
	<b>Sub total</b>	<b>37072</b>	<b>42965</b>	<b>41087</b>	<b>40374.67</b>
<b>B.</b>	<b>Material Cost</b>				
1.	Value of Seeds	12256.00	12237.00	12218.00	12237.00
2.	Value of fertilizer and manure	11768.00	12310.00	13341.00	12473.00
3.	Value of plant protection	2246.00	2391.00	2349.00	2328.67
4.	Irrigation charges	8010.00	8516.00	8669.00	8398.33
	<b>Sub total</b>	<b>34280.00</b>	<b>35454.00</b>	<b>36577.00</b>	<b>35437.00</b>
<b>C.</b>	<b>In-direct cost</b>				
1.	Taxes, land revenue	12.00	12.00	12.00	12.00
2.	Depreciation	2406.00	2666.00	3509.00	2860.33
3.	Interest on working capital (@ 5%)	2767.60	3320.95	3183.20	3090.58
4.	Rental value of own land (1/6 of Gross income)	24172.50	28700	38480.67	30451.05
5.	Interest on fixed capital (@ 10%)	1553.00	1848	2054.00	1818.33
	<b>Sub total</b>	<b>30911.10</b>	<b>36546.95</b>	<b>47238.87</b>	<b>38232.30</b>
	<b>Grand total</b>	<b>102263.10</b>	<b>114965.95</b>	<b>124902.87</b>	<b>114043.98</b>

**Table.4** Cost of tomato production (Cost concepts, Rs. /ha)

S. No.	Cost	Size group			
		Small	Medium	Large	Average
1.	Cost A <sub>1</sub> & A <sub>2</sub>	60537.60	72417.95	70368.20	67774.58
2.	Cost B <sub>1</sub>	62090.60	74265.95	72422.20	69592.91
3.	Cost B <sub>2</sub>	86263.10	102965.95	110902.87	100045.98
4.	Cost C <sub>1</sub>	78090.60	86265.95	86422.20	83592.91
5.	Cost C <sub>2</sub>	102263.10	114965.95	124902.87	114043.97
6.	Cost C <sub>3</sub>	112489.41	126462.54	137393.15	125448.36

**Table.5** Return of tomato production (Rs. /ha)

Particulars	Size group			
	Small	Medium	Large	Average
Main product (q/ha)	383	381	394	379.33
Price of per quintal	620	610	586	605.33
Cost of production(Rs/q)	293.70	331.92	348.71	324.77
Gross income (Rs/ha)	237460	232410	230884	229678
Net income	124970.59	105947.46	93490.85	108136.30
Benefit cost ratio	1:2.11	1:1.83	1:1.68	1:1.87

**Table.6** Constraints in the production of tomato

S. No.	Constraints relating to	Size group				Ranking
		Small (N= 20)	Medium (N= 20)	Large (N= 20)	Total (N= 60)	
1.	High cost of quality seed	19 (95)	18 (90)	15 (75)	52 (86.66)	I
2.	Lack of labour	17 (85)	13 (65)	17 (85)	47 (78.33)	II
3.	Costly irrigation	19 (95)	10 (50)	15 (75)	44 (73.33)	IV
4.	Costly equipments	05 (25)	14 (70)	12 (60)	31 (51.67)	VII
5.	Lack of capital	17 (85)	11 (55)	08 (40)	36 (60.00)	VI
6.	Lack of knowledge about insect, pest and diseases	16 (80)	12 (60)	10 (50)	38 (63.33)	V
7.	Costly and irregular supply of electricity	09 (45)	13 (65)	13 (65)	45 (75.00)	III
8.	Lack of knowledge about seed treatment	11 (55)	09 (45)	05 (25)	25 (41.66)	VIII
9.	High price of labour	06 (30)	05 (25)	07 (35)	18 (30.00)	IX

**Table.7** Break up of inputs use under different size of farms for tomato cultivation (unit- ha)

S.No.	Particular	Small	Medium	Large	Average
1.	Family labour (days)	80	60	70	70.00
	Hired labour (days)	60	111	83	84.66
	Total human labour (days)	140	171	153	154.66
2.	Machine power cost (Rs.)	7203	6573	8211	7329.00
3.	Seed (Rs.)	12256	12237	12218	12237.00
4.	Plant protection (Rs.)	2246	2391	2349	2328.67
5.	Manures & Fertilizers (Rs.)	11768	12310	13341	12473.00
6.	Irrigation (Rs.)	8010	8516	8669	8398.34

On the basis of above discussion the conclusion is that net return over cost  $A_1$  and  $A_2$  and net return on cost  $C_3$  was comparatively higher in small size farm. The additional bonus point gone in the favours of small size group was higher benefit cost ratio in small size farm indicate that inspire of financial crisis and other constraints this category of farm organized and managed its farm operation effectively compared to medium large size farms in the cultivation of tomato crop. Involvement of higher human labour in this category indicates that under the situation of zero opportunity cost of family labour was appreciably utilized in this category with this intension that in cash payment term it required nothing except food and shelter which was a fixed liability of tomato growers.

Table 6 shows that the constraints faced by the sample farmers in the production of tomato were clubbed in respective types of problems as per the incidence of their severity commonly faced by all the respondents as an independent unit. Within the observed constraints in production of tomato, High cost of quality seed, Lack of labour, Costly and irregular supply of electricity, Costly irrigation, Lack of knowledge about insect, pest and diseases, Lack of capital, Costly equipments, Lack of knowledge about seed treatment and High price of labour.

In conclusions, the socioeconomic conditions of three categories of sample households were considered composition of family size and household earning members, educational status, land ownership pattern, income level and sources of income of the sample farmers For all the enterprises seven explanatory variables were taken into account to explain variations in production. In the study areas selected tomato farmers faced various types of problems like, lack of capital, inadequate supply y of good quality seeds, unavailability and high price of insecticides, high price of fertilizers, loss of production due to theft, inadequate storage facilities, lack of marketing facilities, lack of market information etc. However, tomato was found to be an important, leading, and higher profitable vegetable in the study areas. There were some constraints which have hampered the tomato production. If modern inputs and production technologies were available in time, yield and production of tomato would have been increased as well as income, improved livelihood and nutritional status of rural people would have been changed. It is therefore, recommended that irrigation facilities, effective policy and efficient extension services have to be ensured to increase income and employment opportunities of the tomato farmers. It is also recommended to bring more fellow land under tomato cultivation in the study areas. Due to increased domestic consumption of tomato as

human food, the present and future potential market should be established through a well-planned tomato production program at national level.

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