Advances in Agriculture for Doubling of Farmer's Income

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AN ECONOMIC ANALYSIS OF BRINJAL CULTIVATION IN CHHATTARPUR DISTRICT OF MADHYA PRADESH, UNDER TEJASWINI RURAL WOMEN EMPOWERMENT PROGRAM

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ABSTRACT
It is observed from the data that an average total cost in cultivation of brinjal under beneficiary house hold (HH) (Rs.20911.12/acre) was found to be 13.45 per cent more than an average non-beneficiary HH (Rs. 18431.39/acre). The cost of production to produce a quintal of brinjal was also found to be 18.70 & 3.37 per cent less at total variable cost and total cost of cultivation of brinjal on an average beneficiary's as compared to non-beneficiary's HH farm, while net income received from production of brinjal was found to be 20.10 & 16.49 per cent more at total variable cost and total cost of cultivation respectively, resulted in increase of return per rupee investment by 29.48 & Rs. 1.83 per cent more at total variable cost and total cost of cultivation, on an average beneficiary's as compared to an average non- beneficiary's HHs farm, respectively.

Keywords: Production, Cost of Cultivation, Income and Profitability

INTRODUCTION
Brinjal (*Solanum melongena* L.) more commonly known as eggplant is one of the most important vegetables grown throughout the country for its purple, green or white pendulous fruit. It is a member of the Solanaceae family and closely related to tomato and potato (Raza *et al.*, 2018).

India is the second largest producer of vegetables in the world next to China. In India, brinjal is grown on 0.72 million hectares, equaling 10% of the total area under vegetable crops (NHB 2014), next only to China. Its yield, however, is low (18.6 t/ha), just half of that in China. One of the main reasons for low yield is inadequate and erratic supply of irrigation water (Narayanamoorthy, 2018). Brinjal is the fourth most important vegetable grown after potato, onion and tomato in India. It is planted in three seasons; first in *Kharif* (June-September), second in *Rabi* (November-February) and third in the month of March. This vegetable crop is primarily grown by small and marginal farmers and it is an important source of income for them. Brinjal production faces a number of problems which cause enormous yield losses. Fruit and shoot borer (FSB) is the most devastating insect-pest of brinjal, which causes 60-70% yield loss (Kumar *et al*., 2010). Vegetable production area of Madhya Pradesh is 2296.50'000 acre, out of which 52364 acres of area is being produced in brinjal, whereas the area of brinjal in Chhatarpur district is maximum because it produces very large quantities and large scale is done. The production of brinjal in Madhya Pradesh is being done in most Chhatarpur (4775.00 acres) and Sagar (3421.00 acres) districts.

OBJECTIVES
1. To work out the cost and return structure of brinjal cultivation

2. To identify the major constraints confronted by the farmers in brinjal cultivation.

RESEARCH METHODOLOGY
A list of all the beneficiaries under Chattarpur (2014), has been provided by the office of the Madya Pradesh Vitta Vikas Nigam (MVVN), Bhopal. Further, 1 per cent of beneficiaries viz. 20 in Chhatarpur districts have been selected for the study. Thus, 20 beneficiaries along with the same number of non beneficiaries (20) were also selected from the same villages having same size of holding and socio economic status for the study, constituting total size of sample of 40 respondents. These beneficiaries were further classified as per the cultivation of vegetables grown by them in the area under study. Beneficiaries were found to grow several vegetables viz. brinjal, tomato, okra, potato, cucurbits, chili, cowpea, beans, cabbage, radish and leafy vegetables out of which on the basis of percentage of vegetables grown by the maximum numbers have been considered for the study (Table 1).

Table 1: Brinjal vegetables grown by beneficiaries and non-beneficiaries

Vegetable Crops	No. of respondents		
	Beneficiaries	Non-Beneficiaries	Total
Brinjal	20	20	40

n= Numbers of Respondents

The primary data were collected from the selected respondents on various parameters viz. socio economic conditions, land use pattern, cropping pattern, cost of cultivation of brinjal vegetables and local practices, family consumption etc. control vs treated techniques was used to analyze the impact of brinjal production vis-a-vis local practices.

The suitable analytical tools were used to draw conclusions including compared means techniques. The study was conducted during the year 2018-19.

ANALYTICAL PROCEDURE

Following concepts were used to draw conclusion.

1. Percentage Change over Non-Beneficiaries

$$\text{Percentage Change} = \frac{\text{Yn (Beneficiaries)} - \text{Yo (Non- Beneficiaries)}}{\text{Yo (Non- Beneficiaries)}} \times 100$$

2. Mean

The average of the variables used for the study.

$$\text{Mean} \quad \bar{X} = \frac{\sum x}{n}$$

Where,

X = Mean of the variables

$\sum x$ = Sum of scores (observation) of variables

n = Total number of respondents

3. **Interest of working Capital** @10 per cent of variable inputs
4. **Rental Value of owned land** @1/6 of gross income
5. **Interest on fixed capital** @10 per cent of total capital assets (excluding land).
6. **Managerial Cost** @10 per cent of total cost to account for managerial input.
7. **Cost of cultivation (per acre)** = Operational Cost+Input Cost+Fixed Cost+Managerial Cost
8. **Net income** = Gross income-Total cost of cultivation
9. **Cost of production (per q)** = (Total cost of cultivation –value of by product)/ Yield
10. **Cost Benefit Ratio** = Gross Income /Total Cost

ESTIMATION OF COSTS AND RETURNS

Results and Discussion

Under the Tejaswini programme, for the production of vegetable in the first year, financial assistance of Rs. 3,000 for seed, fertilizer, plant protection measures and crop management is provided. Most of the beneficiaries are produced on large scale for the domestic consumption of brinjal vegetables and the remaining quantity is selling in the local market as well as outside.

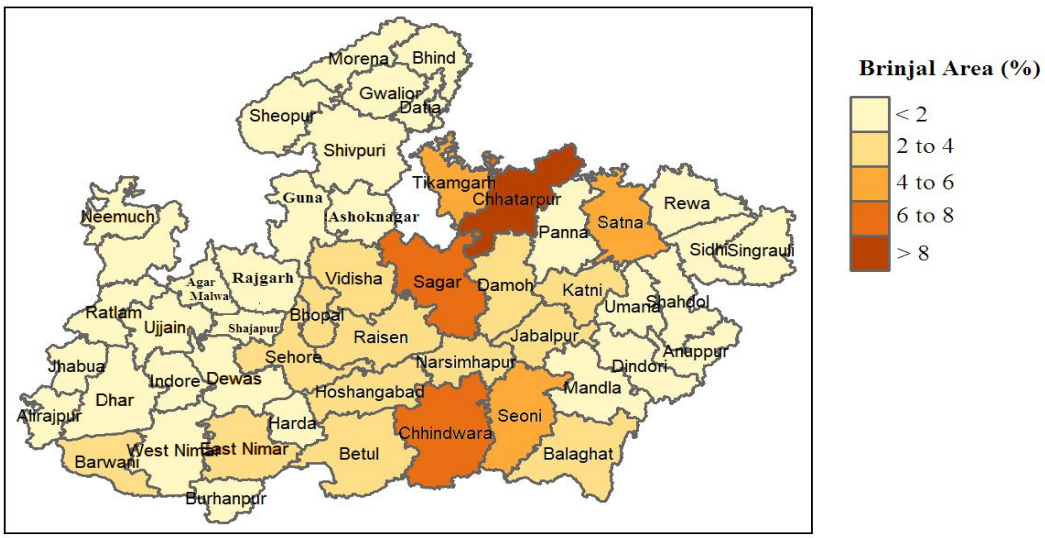

Fig. 1. Districts wise area in percentage of brinjal crop of MP under the study

Brinjal crop was found to be a major vegetable grown by sample respondents both in kharif and rabi season by the respondents of the study area.

(A) Cost of Cultivation of Brinjal

The cost of cultivation of brinjal for beneficiary and non beneficiary house holds (HHs) is presented in (Table 1). It is observed from the data that an average total cost in cultivation of brinjal under beneficiary HH (Rs.20911.12/acre) was found to be 13.45 per cent more than an average non-beneficiary HH (Rs. 18431.39/acre). An average beneficiary HH was found to used less expenditure on bullock labour (-16.70%), human labour (-16.10%), machine labour (-10.12%), family human labour (-7.85%), seed (-5.56%), irrigation (-7.09%), seed treatment material (-100.00%), while invested more on manures & fertilizer (95.39%) & insecticide (72.81) in cultivation of brinjal as compared to non beneficiary HH.

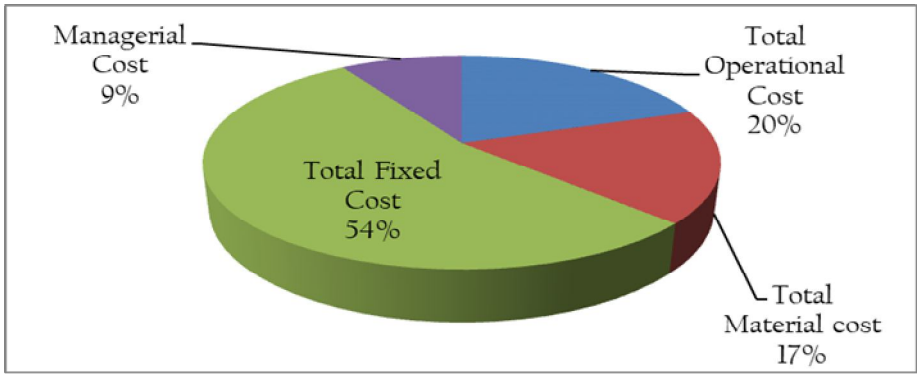

Fig. 2. Contribution of different cost in cost of cultivation of brinjal (beneficiaries)

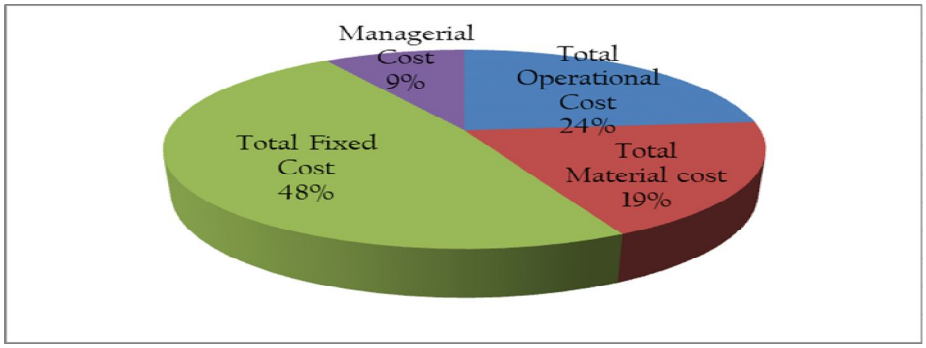

Fig. 3. Contribution of different cost in cost of cultivation of brinjal (non-beneficiaries)

Table 2: Cost of cultivation of brinjal (Rs/Acre)

Particulars		Beneficiaries	Non-Beneficiaries	% Change over Non-Beneficiaries
1.Operational Cost				
A. Human labour-	Family	1680.00 (40.34)	1823.12 (38.05)	-7.85
	Hired	793.12 (19.04)	945.3 (19.73)	-16.10
B. Machinery Power		93.66 (2.25)	104.21 (2.18)	-10.12
C. Bullock labour		1598 (38.37)	1918.44 (40.04)	-16.70
Total Operational Cost		4164.78 (100)	4791.07 (100)	-13.07
2.Material Cost				
A. Seed		850 (22.30)	900 (23.31)	-5.56
B. Seed Treatment		0 (0.00)	20 (0.52)	-100.00
C. Manure & Fertilizers		1723 (48.47)	1789 (46.34)	95.39
D. Insecticide		324 (9.11)	445 (11.53)	72.81
E. Irrigation		590 (16.60)	635 (16.45)	-7.09
F. Depreciation		68.03 (1.79)	71.42 (1.85)	-4.75
Total Material cost		3555.03 (100)	3860.42 (100)	-7.91
Total Variable cost		**7719.81**	**8651.49**	-10.77
3. Fixed Cost				
A. Rental Value of own land		11250.00 (156.53)	9737.50 (162.81)	15.53
B. Revenue /tax		12 (0.17)	12 (0.20)	0.00
C. Interest on Fixed capital		28.3 (0.39)	30.4 (0.51)	-6.91
Total Fixed Cost		11290.30 (100)	9779.90 (100)	15.44
Managerial Cost		1901.011	1843.139	3.14
Total Cost of Cultivation		20911.12	18431.39	13.45

(Figures in parenthesis show the percentage to respective total)

The indirect cost (fixed cost) was found 15.44 per cent higher in case of an average beneficiary HH as compared to non-beneficiary HH. In total cost of cultivation of brinjal the share of total fixed was found to be 6 per cent higher on an average non beneficiary HH farm (48%) than an average beneficiary HH farm (54%), while share of total operation cost and total material cost in total cost of cultivation was found to be 4 and 2 per cent less on an average beneficiary HH farm than an average non beneficiary HH farm. The managerial cost was found to be identical in case of an average beneficiary (9%) and non- beneficiary HH farm (9%) in cultivation of brinjal. As in total cost of cultivation of brinjal the share of total operational cost, total material cost, total fixed cost and managerial cost were found to be 20 & 24, 17 & 19, 54 & 48 and 9 & 9 Per cent in case of beneficiaries and non- beneficiaries farms, respectively.

PROFITABILITY OF BRINJAL

The cost of production to produce a quintal of brinjal was also found to be 18.70 & 3.37 per cent less at total variable cost and total cost of cultivation of brinjal on an average beneficiary's as compared to non-beneficiary's HH farm, while net income received from production of brinjal was found to be 20.10 and 16.49 per cent more at total variable cost and total cost of cultivation, respectively, resulted in increase of return per rupee investment by 29.48 and Rs. 1.83 per cent more at total variable cost and total cost of cultivation, on an average beneficiary's as compared to an average non-beneficiary's HHs farm respectively (Table 3).

Table 3: Profitability in cultivation of brinjal (Rs/Acre)

Particulars		Beneficiaries	Non-Beneficiaries	% Change over Non-Beneficiaries
Yield (q/acre)		45	41	9.76
Rate/quintal (Rs.)		1500	1425	5.26
Main Product (Rs./acre)		67500	58425	15.53
Gross Return		67500	58425.00	15.53
Net Income	Over Variable Cost	59780.19	49773.51	20.10
	Over Total Cost of Cultivation	46588.88	39993.61	16.49
Cost of production (Rs/q)	Over Variable Cost	171.55	211.01	-18.70
	Over Total Cost of Cultivation	464.69	449.55	3.37
Return/Rs. investment	Over Variable Cost	8.74	6.75	29.48
	Over Total Cost of Cultivation	3.23	3.17	1.83

(B) Constraints in Brinjal Cultivation

A total postharvest loss of brinjal was 23.38%. Highest loss was estimated that 12.51% at the grower level. Among different intermediaries post harvest loss of brinjal was highest at retail level (5.96%) than Aratia level losses (2.35%) and trader level losses (2.65%) (Kaysar *et al*., 2016). Sixteen insecticides under different trade names were most commonly sprayed. Maximum brinjal growers were sprayed this insecticides more than 40 times during the period of whole cultivation. A diverse range of constraints impede brinjal production. These include pests and abiotic factors. The major groups of pests and abiotic factors impeding brinjal production, were insects (34%), fungi (23%), bacteria (13%), nutrient efficiency (12%), mites (8%), viruses (3%), nematodes (2%), and water moulds (2%). It is highly likely that frequencies of biotic and abiotic constraints were influenced by time, tomato variety and location (Willis *et al*., 2019)

CONCLUSION AND POLICY IMPLICATIONS

Most of the vegetables available in the market are out of the reach of a common man due to their high prices, particularly in the recent period. The per capita availability of vegetables in the country is 190 gram per day as against the normative requirement of 280 gram per day. The vegetable deficit underscores the need for substantial increase in vegetable production and affordability to consumers.

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