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Cost and Returns from Brinjal in the Study Area

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The research work entitled "Economics of Brinjal production in Dhamtari Block of Chhattisgarh – An Economic Analysis.'' was carried out with a view to estimate the costs and returns in brinjal production. Five Villages from Dhamtari block were selected purposively on the basis of area under brinjal crop. After selection of this villages, a list of brinjal growing farmers were prepared and further categorized into three size group on the basis of size of land holding, i.e. small farmer (up to 2.0 ha), medium farmer (2.01 to 4 ha), From each size group 20 farmers were selected randomly. The required data was collected by conducting personal interview of respondents with the help of pre-tested interview schedule. On the primary data pertain to Agricultural year 2015-16, various farm business analysis were carried out to analyze the collected data. The data was analyzed in light of objective using cost of cultivation profitability concept and breakeven production and price. The findings of the study revealed that family size and cultivated area had positive relation with the farm size. The total cost per hectare incurred on brinjal had inverse relation with farm size. The total operational and fixed cost was 56.62 per cent (Rs.49000.48) and 43.37 per cent respectively (Rs.37539.14). Cost concept i.e. A1, A2 B1, B2, C1, C2 and C3 revealed inverse relation with their farm size. The gross income and net income was estimated to Rs 208221 and 113027.23 respectively and benefit cost ratio was found to be 2.18 at aggregate level. Break even yield and prices was estimated to 99.19q/ha and Rs 433.94 respectively.

Introduction

Brinjal (*Solanum melongena*) is a native of India and perhaps China is a secondary centre of origin. It is one of the important vegetables of tropical countries, particularly India, Bangladesh, Pakistan, China, Japan, Southeast Asia- Indonesia, Thailand and Malaysia and Philippines. There are at least 33 Sanskrit names for eggplant in ancient literature in India. The first record of eggplant in India was during 300 B.C, to 300 A.D. while in China it was described about 500 years ago, perhaps in the 6th century, A.D. It was cultivated in Arica before the middle ages (1).

The vegetable production in India has touched a new height in recent years, placing it as the second largest producer of vegetables in the world, next only to China (Kumar *et al.,* 2005; Kumar *et al.,* 2004). The growing population and the improving economic status in the country have increased vegetables consumption, both across regions and income groups (Kumar and Mathur, 1996; Kumar, 1998) Vegetable cultivation is capital intensive and production risks are very high (Alam, 2001). About 90-98 per cent of the vegetables are sold and used afresh, except some roots and tubers (Subramanian *et al.,* 2000; GOI, 1989) and only 1 per cent of the vegetable output is being processed commercially (Verma *et al.,* 2002). It is an important cash-generating crop to

small-scale farmers and provides employment in the production and processing industries (2).

Farmers are interested in brinjal production more than any other vegetables for its multiple harvests potential of year round production, which results in high profit per unit area. Besides countrywide problem it helps people in their personal interest to increase input-output ratio, full utilization of farm resources, fulfill the immediate money need being cash crop, less risk, increase in repaying capacity, increase women participation in farming due to its labour intensive nature and finally motivation for the people to adopt the vegetable crop. This study will help us to provide scientific information on the necessary social and psychological factors that would influence the cultivation and large scale brinjal production in the study area (3).

Materials and Methods

This deal with the materials and research methodology adopted for the present study with respect to the selection of study area, selection of respondents, collection of data and analytical techniques. The research methodology adopted has been described into following subheads:
1. The study area
2. Sampling procedure
3. Collection of data
4. Analytical procedure

Study area

The present study was confined to Dhamtari block of Chhattisgarh state, which was selected purposively due to highest area for Brinjal cultivation in Chhattisgarh to get more accurate information. From the Dhamtari block, five villages namely, Gagra, Sarangpuri, Kharenga, Bhothipar and Darri were selected randomly for the study.

Sampling procedure

Selection of respondents (vegetable growers) A list of farmers growing brinjal were prepared in consultation with Rural agriculture extension officer and further categorized into three size group on the basis of their size of holding viz. small (up to 2 ha.), medium (2.01 to 4ha.) and large (above 4 ha.). From each size group 20 brinjal growers were selected randomly the where sample size of 60 respondents.

Collection of data

Primary data

The data were collected using survey method. The data on different aspects were collected through pre-tested interview schedule. Each of the selected samples Brinjal growers were approached personally for recording relevant data and following information were respondent.

Information related to cost of different field operations.

(a) Types of labour engaged for different field operations.
(b) Material cost involved.
(c) Returns from main product.
(d) Price of main products

Period of the study

The primary data were collected in the references related to the agriculture year 2015-16 Rabi season. The data were collected using survey method. The data on different aspects were collected through pre-tested interview schedule. Each of the selected samples Brinjal growers were approached personally for recording relevant data.

Analytical procedure

The primary data was classified and tabulated in the light of stated objectives of the study and analyzed as per the suitable statistics and economic tools as follows. The estimates of profitability were based on different costs and returns incurred in Brinjal cultivation.

Cost concepts

The cost of cultivation classified and recommended by "special expert committee on cost estimates, GOI, New Delhi" was used in this study and are given below:

Cost A1 = All actual expenses incurred in the

Brinjal production.

Cost A1: it includes:-

i. Value of hired human labour,
ii. Value of hired and owned bullock labour,
iii. Value of hired and owned machinery labour,
iv. Value of owned and purchased seed,
v. Value of fertilizers, manures and chemical.
vi. Value of insecticide and pesticides.
vii. Expenditure on irrigation.
viii. Land revenue and taxes.
ix. Interest paid on crop loan if taken.
x. Depreciation on farm assets excluding land,
xi. Interest on working capital,
xii. Miscellaneous expenses.

Cost A2 = Cost A1 + rent paid for leased in land.

Cost B1 = Cost A2 + interest on value of fixed capital excluding land.

Cost B2 = Cost B1 + rental value of owned land.

Cost C1 = Cost B1 + imputed value of family labour.

Cost C2 = Cost B2 + imputed value of family labour.

Cost C3 = Cost C2 + 10 per cent of cost C2

Evaluation of farm inputs

Methods followed in evaluating different farm input for the present study are described in the following paragraphs:

Hired human labour

The farmers normally engage permanent farm labour on the basis of yearly wages and casual labour on daily wages for performing farm operations. The casual labour was evaluated on the basis of actual wages prevailed in the locality. The wages of male and female labour include payment both in cash or kind. The value of kind components given to the labour was calculated at their prevailing market prices.

Family labour

The family labour cost was evaluated the rate of prevailing wages in the locality for casual hired labour at various stages of operations.

Bullock and machinery labour

Estimation of bullock and machine labour charges on actual wage prevailed in the locality were considered. For estimation of depreciation, interest on working capital, interest on fixed capital and rental value of owned land, following standard norms were used.

Depreciation on farm assets

The straight-line method is used for calculating rate of depreciation.

Interest on working capital

It is worked out @ 4 per cent for half of the duration of the crop.

Interest on fixed capital

Interest is charged @ 4 per cent annum on the value of implements, machineries, farm building, and irrigation structure and drought animals. It excludes interest on land input, because rental value of owned land is calculated separately.

Rental value of owned land

It is calculated on the basis of 16.66 per cent (1/6) of the gross income or prevalent rate in the area for the same.

Value of farm produce

This includes the value of main product and of the crop. The harvest price of the crop was considered for calculating the value of main produce.

Profitability concept

Gross income = Physical quantity of main product × price/unit. Quantity of by product × price/unit.
Net income = Gross income –Total cost.
Benefit - cost ratio = Gross income/Total cost.
Cost of production (Rs/qui.) = Total Cost / physical Production of brinjal.

Break –even analysis

Break-even point indicates a situation where farmers neither earn profit nor in loss. In other

word break-even points is a point where total cost meet total return plotted on a graph sheet. Breakeven points were obtained as follow:

Break even yield (qt./ha)

Break even yield (qt./ha) =

$$\frac{\text{Total Cost} - \text{Value of by product}}{\text{Output price (Rs/qt.)}}$$

Break even cost (qt./ha) =

$$\frac{\text{Total Cost} - \text{Value of by product}}{\text{Physical production (qt/ha.)}}$$

Results and Discussion

This deal with the results of the cross section data collected from the sample holding and analyzed in the light of the objective stated.

Cost of cultivation

In the farm management studies costs are viewed from different angles for different purposes. Costs of cultivation are used by the Agricultural Cost and Price commission for fixation of support price of agricultural commodities. Besides this, they are also useful in farm planning and policy making. Therefore, operational costs of brinjal were work out to operate agriculture in an over under study and presented in table.

The farmers cultivated brinjal crop in 15.33 per cent of the gross cropped area of the sample farm. It is observed from the Table that the total cost incurred in cultivation of brinjal at the overall farm was Rs. 95193.76 per hectare which was higher in large farm (Rs. 108702.07/ha) and lowest in small farm (Rs. 80834.68/ha). This revealed inverse relation with the farm size due to scale economies. The operational cost was 56.63 per cent (Rs. 49000.48) of the total cost and the fixed cost was Rs. 37539.14, accounted for around 43.37 per cent of the total cost.

The labour cost on an average accounted to be 28.05 per cent of the total cost which varied from 27.12 per cent in large farm to 29.33 per cent in medium farm. The variation in total labour requirement among different size farms is due to

difference in the style of operational practices.

Among material cost, seed alone contributed about 1.55 per cent at overall level of the total cost lowest (Rs. 1282.95/ha) being in medium farm and highest being in large farm (Rs. 1422.72/ha). The expenditure on Manure and fertilizer together accountant 13.47 per cent of the total cost on sample farm which varied between 12.52 to14.16 per cent for different size groups. Irrigation cost on an average accounted to be 2.90 per cent of the total cost. Plant protection chemical cost was around 8.69 per cent of the total cost. Interest on working capital was to the extent of 1.93 per cent of total cost on various sizes of farms. Rental value of land fixed items shared 40.10 per cent of the total cost which revealed inverse relation with farm size. The yield of main product per hectare was found to be 219.18/ha at overall level, lowest being in small farm (189.8q/ha) and highest being in large farm (250.14qt/ha), indicating the intensive cultivation of brinjal by sample farmers in the study area.

Cost concept

Almost every day in farm organization and operation cost consideration enters. It is an important tool for measuring farm business activities. The farm management specialists have specified cost of cultivation into cost A1, A2, B1, B2 Cost C1, C2 & C3. These cost concepts have already been taken up in the methodology chapter. In this section efforts have been made to discuss cost of cultivation according to various costs concepts.

The table clearly shows that on an average total cost of (cost c3) Rs. 95193.76 per hectare was required to produce this crop of an overall level which 53.45 per cent comprised for the variable cost commonly known as cost A1and A2 After adding interest on fixed capital to cost A1, the cost went up to 53.58 per cent as cost B1 and when imputed value of land was further added it increased up to 93.68 per cent. Thus cost the C2 and 10 per cent cost of the cost C2 when added in this cost, it form total cost or cost C3. Table further inferred that cost A1 to Cost C3 increases with the increase in size of holding.

Table.1 Selection of respondents according to farm size

Size group	Total No. of Brinjal growers	No. of farmers selected	Percentage of farmers selected
Small	60	20	33.33
Medium	52	20	38.46
Large	30	20	66.66
Total	142	60	42.25

Table.2 Cost of cultivation of brinjal on sample farm (Rs/ha)

Particulars		Size group			
		Small	**Medium**	**Large**	**Overall**
1. Operational cost					
A. Labour cost					
i.Human labour	Family	5585 (7.60)	6441.71 (7.37)	4372 (4.42)	5466.23 (6.31)
	Hired	12540.30 (17.06)	16673.22 (19.09)	18887.17 (19.11)	16033.56 (18.52)
ii. Machine labour	Owned + Hired	2300 (3.12)	2500 (2.86)	3545 (3.58)	2781.66 (3.21)
Sub Total		20425.30 (27.79)	25614.93 (29.33)	26804.17 (27.12)	24281.46 (28.05)
B. Material cost					
i. Seed		1322.70 (1.79)	1282.95 (1.46)	1422.72 (1.43)	1342.79 (1.55)
ii. fertilizer & manure		10060.41 (13.69)	10931.96 (12.52)	13995.64 (14.16)	11662.67 (13.47)
iii. Plant protection		5536 (7.53)	7794 (8.92)	9240.10 (9.35)	7523.36 (8.69)
iv. Irrigation charges		2662 (3.62)	2349.09 (2.69)	2536.31 (2.56)	2515.80 (2.90)
Total material cost		19581.11 (26.64)	22358 (25.60)	27194.77 (27.51)	23044.62 (26.62)
Interest on working capital@4%		1376.85 (1.87)	1661.24 (1.90)	1985.07 (2.00)	1674.38 (1.93)
Total operational cost (A+B)		41383.26 (56.30)	49634.17 (56.84)	55984.01 (56.65)	49000.48 (56.62)
A. Rental value of land		30051.66 (40.89)	34453.33 (39.45)	39605.5 (40.07)	34703.49 (40.10)
B. Depreciation		1960.78 (1.87)	3089.73 (3.53)	3094.72 (3.13)	2715.07 (3.13)
C. Revenue/tax		12.00 (0.014)	12.00 (0.012)	12.00 (0.011)	12 (0.013)
D. Interest on fixed cost@4%		78.43 (0.10)	123.58 (0.14)	123.7 (0.12)	108.60 (0.12)
Total fixed cost		32102.87 (43.68)	37678.64 (43.15)	42835.92 (43.34)	37539.14 (43.37)
Total cost (Operational cost + Fixed cost)		73486.08 (100)	87313.23 (100)	98820.07 (100)	86539.79 (100)

(Figures in brackets indicate percentage to the total)

Table.3 Cost of cultivation of Brinjal according to cost concept on sample farms

S.No.	Cost	Size group			
		Small	**Medium**	**Large**	**Overall**
1	CostA_1 & A_2	37771.04	46294.19	54718.73	46261.32 (53.45)
2	Cost B_1	37849.47	46417.77	54842.43	46369.89 (53.58)
3	Cost B_2	67901.13	80871.10	94447.93	81073.38 (93.68)
4	Cost C_1	43434.42	52859.9	59214.40	51836.23 (59.89)
5	Cost C_2	73486.08	87313.2	98820.2	86539.79 (100)
6	Cost C_3	80834.68	96044.55	108702.07	95193.76 (100)

(Figures in brackets indicate percentage to the total cost)

Table.4 Profitability of brinjal production on sample farm

S.No.	Economic parameter	Size group			
		Small	**Medium**	**Large**	**Overall**
1	Total operational cost	41383.26	49634.17	55984.01	49000.48
2	Total cost	80834.688	96044.55	108702.07	95193.76
3	Yield(q/ha)	189.8	217.6	250.14	219.18
4	Gross income (Rs/ha)	180310	206720	237633	208221
5	Net income	99475.32	110675.45	128930.93	113027.23
6	BC Ratio	1:2.23	1:2.15	1:2.18	1:2.18
7	Cost of production (Rs/q)	425.89	441.38	434.56	433.94

Table.5 Break even yield (q/ha) and price (Rs/qt) of brinjal on sample farm

Size group	Actual yield	Break even yield	Breakeven price
Small	189.8	82.08	425.89
Medium	217.6	101.09	441.38
Large	250.14	114.42	434.56
Over all	219.18	99.19	433.94

Profitability concepts

In any field of business activity profit is the prime consideration. Thus, how much a farmer earns as net income and family labour income as a producing unit and how much satisfaction he and his family derives as a consuming unit are the major deciding factor in organization and operation of farm. Hence, in this section efforts have been made to estimate the gross income, total operational cost and total cost, net income, Benefit cost ratio, cost of production of brinjal a sample farm.

From the table it is clear that the total cost from brinjal were Rs. 80834.68, Rs. 96044.55 and Rs.

108702.07 in case of small, medium and large farm with an average of Rs. 95193.76 on sample farm. Thus, total cost incurred in brinjal production increase with an increase in farm size. When physical output obtained from brinjal are converted into monetary terms Benefit cost ratio in other words can be termed as the return per rupee of investment. The Benefit cost ratio was more favorable to small farm (2.23), followed by medium farm (2.15) and large farm (2.18). Therefore, it could be concluded that there is increase in the ratio of benefit cost ratio as the size of land holding increase.

At overall level the Net income per hectare was found to be Rs. 113027.23/ha, lowest being small

farm (Rs.99475.32/ha) and highest being in large farm (Rs.128930.93/ha) and (Rs.110675.45/ha) in being of medium farm. The overall per rupee investment (B : C ratio) was found to be 2.18 at overall level lowest being in medium (2.15) and highest being in small (2.23) farm size. The cost of production per quintal was found to be 425.89, 441.40 and 434.56 in small, medium and large size found with Rs.433.94/q of overall level.

Break-even analysis

Break even analysis is carried out to arrive at the minimum level at which optimum conditions of cost and returns is equated that is no profit no loss point obtained where the return is equal to total cost.

The break even yield as shows in tale 5.12 implies that with the given cost and physical output, brinjal would remain proposition of no profit and no loss within the yield range of 82.08 to 189.8 qt/ha on small farm, 101.09 to217.6 qt/ha medium farm and 114.42 to 250.14 qt/ha on large farm, thus the existing cost of production and physical output of crop yielded sufficient profit to the sample farms.

The break-even price per quintal was estimated to be Rs. 433.94 on an average at overall level which varied between Rs. 425.89/qt on small farm to Rs 441.38 on medium farm and the selling price as per the market was Rs 950/qt of brinjal. Thus, the farmer had sufficient incremental profit in the study area.

In conclusions, total cost per hectare incurred in brinjal production on sample farm was Rs. 86539.79 the proportion of operational cost and fixed cost to total cost on sample farm was 56.62 and 43.37 of the total cost. Cost of cultivation according to various cost concepts (Cost A1 to Cost C3) in different size of farms increased as the farm size increases. Storage facilities are inadequate at present. Hence, it is recommended that storage facility is required to be made available to solve storage related problems.

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