

## An Economic Analysis of Resource use Efficiency of Green Chillies in Siddipet District of Telangana

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### ABSTRACT

In the present paper an attempt has been made to analyse the efficiency in the usage of resources in the case of green chillies in Siddipet district of Telangana state. The primary data was collected from 65 chilli growing farmers chosen randomly from 6 selected villages. The collected data was analyzed by using Cobb-Douglas production function for estimating the factors affecting resource productivity and for evaluating the efficiency of resources use. The results of the study revealed that bullock labor and fertilizers/manures were underutilized whereas human labor and machine labor were over utilized than the optimum level.

**Keywords** Resource use efficiency, Cobb-douglas function, MVP, MFC, Green chillies.

### INTRODUCTION

India is bestowed with varied agro-climatic conditions which provide ample scope for the cultivation of a variety of spices and hence India is considered as the “Land of spices.” India is one of the largest producer, consumer and exporter of spices and accounts for about a half of the global trade in spice sector. The statistics for the year 2020-21 indicate that India is estimated to produce 106.79 lakh tonnes of spices from an area of 45.28 lakh hectares. Among the various spices cultivated green chillies occupy second position in terms of both area (7.29 lakh hectares) and production (20.92 lakh tonnes) which account for about 16 % and 20 % share among the total spices respectively. Despite having such a huge production base, chilli growers often do not derive the expected returns from cultivation due to the poor efficiency in the production pattern of chillies. The efficiency of a chilli grower can be better determined by understanding the conditions under which the cultivation is performed. Cultivation of chillies require resources like seeds, fertilizers, manures, human labor, animal labor, machine labor and various plant protection chemicals. The cost of these inputs and their efficiency of usage influence the profitability of chilli growers to a greater extent. That is, inefficient usage of resources leads to increase in the cost of cultivation and ultimately reducing the net returns from chilli production. It is thus essential to know the contribution of these resources to the total output for increasing the efficiency of farming and also protecting the environment by avoiding the extensive usage of plant protection chemicals (Sowjanya *et al.*

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2016). In the light of aforementioned discussion, it is felt necessary to conduct a comprehensive micro level study to analyse resource use efficiency of chilli cultivation in Siddipet district of Telangana state.

## MATERIALS AND METHODS

The present study was carried out in Siddipet district of Telangana state. 65 chilli growing farmers were randomly chosen from 6 selected villages of the district to collect the primary data required for the study. The collected data was subjected to appropriate statistical tools such as Cobb-Douglas production function to estimate the factors affecting resource productivity. The collected primary data pertains to the *khari* season of the agricultural year 2019-20.

### Cobb-Douglas production function

The production function fitted was of the below form:  
 $Y = a X_1^{b_1} X_2^{b_2} X_3^{b_3} X_4^{b_4} X_5^{b_5} X_6^{b_6} X_7^{b_7} X_8^{b_8} e^u$

Where, Y = Dependent variable

X = Independent variable

a = Intercept

b<sub>1</sub>, b<sub>2</sub> ... b<sub>8</sub> = Regression coefficients

e = Napier base

u = Random error

The Cobb-Douglas form mentioned above was linearized into a logarithmic form to make amenable for practical purposes as expressed below:

$\log Y = \log A + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6 + b_7 \log X_7 + b_8 \log X_8 + \log u$

Where, Y = Gross income

A = Intercept

X<sub>1</sub> = Human labor cost

X<sub>2</sub> = Bullock labor cost

X<sub>3</sub> = Machine labor cost

X<sub>4</sub> = Seed cost

X<sub>5</sub> = Fertilizer and manure cost

X<sub>6</sub> = Pesticide and insecticide cost

X<sub>7</sub> = Herbicide cost

X<sub>8</sub> = Other material cost which included the cost incurred for mulching and cost of growth

promoters used

The independent and dependent variables were considered in rupees per hectare for performing the functional analysis. The production function mentioned above was estimated using the SPSS (Statistical package for the social sciences) software and the output obtained was used for determining the resource use efficiency ratio as mentioned below:

$$r = MVP / MFC$$

Where, r = Resource use efficiency ratio (ratio of the MVP of an input and unit price of the input)

MVP = Marginal value product of a variable input

MFC = Marginal factor cost (price per unit of an input)

### Marginal value product (MVP)

It is the additional income received from using an additional unit of input. It is computed using the following formula:

$$MVP = MPP_i * P_y = (b_i Y / X_i) * P_y$$

**Table 1.** Resource productivity in chilli cultivation. Note: Figures in parentheses indicate standard errors. \* Significant at 1% level. \*\* Significant at 5% level.

Sl.No.	Particulars	Coefficient	P-Value
1	Intercept ( $\beta^0$ )	-6.39	
2	Human labor cost ( $\beta^1$ )	0.999* (0.132)	0.000
3	Bullock labor cost ( $\beta^2$ )	0.392** (0.190)	0.043
4	Machine labor cost ( $\beta^3$ )	0.216* (0.080)	0.009
5	Seed cost ( $\beta^4$ )	-0.101 (0.066)	0.133
6	Fertilizer and manure cost ( $\beta^5$ )	0.330* (0.074)	0.000
7	Pesticides and insecticide cost ( $\beta^6$ )	0.059 (0.073)	0.423
8	Herbicide cost ( $\beta^7$ )	0.039 (0.072)	0.592
9	Other material cost ( $\beta^8$ )	0.021 (0.021)	0.321
10	R square	0.742	
11	Adjusted R square	0.705	
12	F-ratio	20.138*	
13	N	65	

**Table 2.** Resource use efficiency in chilli cultivation.

Sl. No.	Variable	MVP	MFC	Resource use efficiency ratio	Decision rule
1	Human labor cost	106.03	400.00	0.27	Over utilization
2	Bullock labor cost	7019.71	500.00	14.04	Under utilization
3	Machine labor cost	393.87	900.00	0.44	Over utilization
4	Fertilizer and manure cost	234.74	25.00	9.39	Under utilization

Where,  $P_y$  = Price of output

$MPP_i$  = Marginal physical product of the  $i$ th input

$b_i$  = Elasticity coefficient of the  $i$ th independent variable

$Y$  = Geometric mean of the output and

$X_i$  = Geometric mean of the  $i$ th input

### Marginal factor cost (MFC)

It is the change in total input cost by adding additional unit of an input. The per unit price of an input is taken as the marginal factor cost.

## RESULTS AND DISCUSSION

The estimated parameters of Cobb-Douglas production function analysis is presented in Table 1. All the selected variables showed positive impact on gross income except seed cost which was negative and insignificant. Four independent variables, out of eight were found significant viz., human labour cost, bullock labour cost, machine labour cost and fertilizers/ manures cost. Among these, human labour cost, machine labour cost and fertilizer / manure cost were highly significant at 1% level whereas the bullock labour cost was significant at 5% level. It can also be mentioned that the gross returns of chilli can be enhanced approximately upto 0.999%, 0.392%, 0.216% and 0.33% with one per cent increase in cost of human labour, bullock labour, machine labour and fertilizers/manures respectively. The included explanatory variables could explain 74.2% of variation in gross income on an average as the calculated value of the coefficient of multiple determination ( $R^2$ ) was found to be 0.742. (Kumar *et al.* 2018). The highly significant value of F-ratio indicated the importance of independent variables in explaining the gross re-

turns obtained from cultivation of chilli.

### Resource use efficiency in chilli cultivation

The efficiency in the usage of resources is presented in Table 2. The MVP to MFC ratio was highest for bullock labour (14.04) followed by fertilizers/manures (9.39), thus indicating the scope for higher usage of these inputs from the present level to optimize returns. These results were found to be in accordance with those of Jagtap *et al.* (2014), Mathew *et al.* (2017) and Ogunwole *et al.* (2019). The human labor and machine labor were slightly over used than the economic optimum as revealed by the MVP/MFC ratio of 0.27 and 0.44 respectively.

In a nutshell, the usage of bullock labor and fertilizers/manures need to be increased whereas the usage of human labor and machine labor need to be reduced to achieve the efficiency in the utilization of resources in chilli cultivation.

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