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Original Research Article

Resource Use Efficiency of Turmeric Production in Satara District of Maharashtra

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Keywords

Cobb-Douglas production function, Regression coefficient, Resource use efficiency, Turmeric

A B S T R A C T

To estimate resource use efficiency in turmeric production Cobb-Douglas type of production function was best fitted to the data. Independent variables identified were seed q (X1), human labour days (X2), manure ton (X3), fertilizers kg (X4), plant protection chemicals lit (X5), irrigation (X6) and dependent variable as production of turmeric (Y). Among the inputs used for production of turmeric, which have positive and significant influences at the overall level, the MVP to PX ratio were more than one for seed material (3.235), human labour (9.990), manures (13.127) fertilizers (28.128), plant protection chemicals (55.083), irrigation (244.65) indicated under utilization of these resources in cultivation of turmeric.

Introduction

Turmeric is an aromatic medicinal plant also known as 'Indian saffron' which is an important commercial spice crop grown in India Area under turmeric was 224 thousand ha and production was 1107 thousand MT during 2017-18 in India. In 2017-18 Maharashtra was having second rank (190.09) in turmeric production, while Telangana was first in area (50.15) and production (294.56) of turmeric. Gujrat having highest productivity (19.70). In Maharashtra, Satara having second rank with area 1452 ha, production 88150 MT and productivity 5.5 MT/ha. The increase in production is possible mainly through improvement in productivity of the crop that could be achieved by efficient utilization of available resources. In this context, assessment of the existing level of resource-use in production of turmeric assumes great importance. Hence, the present study was conducted with the objective of assessing the resource use efficiency of turmeric production.

Materials and Methods

A multistage sampling technique was used in this study for selection of turmeric cultivators. Western Maharashtra zone was purposively selected for the present study where there is more potential for turmeric production. Satara district was selected purposively as turmeric production is increasing in this district. Two tahsils namely, Wai and Satara having maximum area under turmeric were selected purposively. From each tahsil, six villages were selected randomly and from every

selected village ten farmers were selected randmoly. From each tahsil sixty turmeric cultivators were selected randomly. Thus the total sample consists of 120 turmeric cultivators which were analyzed to obtain appropriate results. The data for the present study were collected in the month of October 2019 pertained to the agriculture year 2018-19 from the selected turmeric growers.

Analytical tools

The following form of cob-Douglas production function was used.

$$Y = aX_1^{b1}X_2^{b2}X_3^{b3}X_4^{b4}X_5^{b5}$$

The estimated log linea
r form of above production was used for analysis of data.

$$\log Y = a + b_1 logX_1 + b_2 logX_2 + b_3 logX_3 + b_4 logX_4 + b_5 logX_5$$

Where,
Y = Yield of turmeric (Kg)
X_1 = Seed (Kg)
X_2 = Human labour (days)
X_4 = Manures (Kg)
X_5 = Plant protection (Kg)
X_3 = Fertilizers (Kg)

In this functional form, 'Y' is the dependent variable and $X_1, X_2, X_3, \ldots, X_5$ are the independent variables were considered on per hectare basis. The regression coefficients obtained from this function are also called as elasticities of production. The sum of coefficients of regression i.e. b_1 *to* b_5 are indicates return scale.

Estimation of MPP and MVP

The following formulae were used for calculation of marginal physical product and marginal value product.

1. Marginal Physical Product (MPP) :

MPP_{Xi}=bi $\frac{\bar{Y}}{\overline{Xi}}$

Where,
b_i = Production elasticities of i^{th} input
$\bar{Y}$ = Geometric mean of output
$\overline{Xi}$ = Geometric mean of i^{th} input

2. Marginal Value Product (MVP) :

$MVP_{Xi} = MPP_{Xi} \times$ price per unit of output

3. Marginal cost (MC):

MC = price per unit of input.

Allocative resource use efficiency -

After estimating the MVP, the resource use efficiency of different resources were judged with the help of MVP to factor cost ratio as under,

MVP/FC = 1 Optimum use of resources
MVP/FC < 1 Excess utilization of resources
MVP/FC > 1 Under utilization of resources

Results and Discussions

The relationship between per farm inputs in production of turmeric was studied by employing Cobb-Douglas type production function is presented in Table 1. Resource use efficiency was calculated at overall level.

The regression coefficient for human labour (0.2235), fertilizers (0.3653) and irrigation (0.4706) were positive and statistically significant at 5 per cent level and for seed material (0.0331), manure (0.0659), plant protection chemicals it was positive and non-significant. The coefficient of determination (R2) was observed to be 0.61. This indicated that, 61.00 per cent of variation in turmeric

production explained by identified input variable included in the function. The sum of elasticity coefficient was 1.24, which was greater than one indicated increasing returns to scale.

It was seen from the Table 2. that, among the inputs used for production of turmeric, which have positive and significant influences at the overall level, the MVP to P_X ratio were more than one for seed material (3.235), human labour (9.990), manures (13.127) fertilizers (28.128), plant protection chemicals (55.083), irrigation (244.65) indicated under utilization of these resources in cultivation of turmeric.

Table.1 Coefficients of regression of inputs for production of turmeric at overall level

Sr. No.	Particulars	Coefficients of regression
1	Seed material	0.033155
2	Human labour	0.223538*
3	Manures	0.065871
4	Fertilizers	0.365288*
5	Plant protection chemicals	0.081172
6	Irrigation	0.470602*
7	Intercept	1.137601
8	R square	0.615296
9	Return to scale	1.24

* = Significance at 5 per cent level of probability

Table.2 Resource use Efficiency in turmeric production

Resources	MPP	MVP	MFC	MVP /MFC	Level of resources used
Seed material	1.4642	9232	2853.64	3.23	Under utilized
Human labour	1.4534	9164	917.32	9.99	Under utilized
Manures	1.4934	9416	717.31	13.13	Under utilized
Fertilizers	1.5910	10031	356.63	28.12	Under utilized
Plant protection chemicals	1.7055	10753	195.22	55.08	Under utilized
Irrigation	1.9654	12392	50.65	244.65	Under utilized

(MPP: Marginal physical product, MVP: marginal value product, MFC: Marginal factor cost).

Conclusions and policy implication are as follows

The study revealed that, intensive use of fertilizers (kg) and irrigation (no.) increase in use of these resources had positive and significant influence on production. This revealed that, the crop had further advantage in expanding output level under given conditions of production. Analysis of resource use efficiency shows that most of the resources are under utilized for example manures fertilizers, plant protection, irrigation etc. Farmers are advised to utilize these resources fully, so as achieve maximum profit.

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