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Research Article

RESOURCE USE EFFICIENCY IN TURMERIC CULTIVATION IN NAVSARI DISTRICT OF GUJARAT

VIRAJA C.V.[1*], THUMAR V.M.[2], SINGH NARENDRA[3], THANKI P.M.[4] AND TANDEL V.B.[5]

[1,5]Department of Agricultural Economics, N.M. College of Agriculture, Navsari Agricultural University, Navsari, 396450, Gujarat, India
[2]Planning Officer, Directorate of Research, Navsari Agricultural University, Navsari, 396450, Gujarat, India
[3]Department of Agricultural Economics, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, 396450, Gujarat, India
[4]Department of Agricultural Economics, College of Agriculture Bharuch, Navsari Agricultural University, Navsari, 396450, Gujarat, India
*Corresponding Author: Email - patelchandrakant8180@gmail.com

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Abstract: The results indicated that the coefficient of multiple determinations (R^2) is 0.90. The result of the study revealed that the rhizomes (0.32), tractor charge (0.19), human labour (0.80) chemical fertilizer (0.26) and FYM (0.19) were found positive and highly significant at 1 percent level. Human labour was found to be the most influential input on yield determination followed by rhizomes, chemical fertilizer, FYM and Tractor & machinery. However, the plant protection chemical (0.02) and irrigation (0.06) were found positive and non- significant. In MVPs it is concluded that, rhizomes, tractor charge, human labour, chemical fertilizer, irrigation and FYM have positive and statistically significant relationship which indicate that an increase in the application of these inputs would lead to increase in the output of turmeric. All the variables except plant protection chemicals were found to be underutilized.

Keywords: Chemical fertilizer, FYM

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Introduction

India is popularly known as the "*Spice Bowl of the World*" as a wide variety of spices with premium quality is grown in the country since ancient times. Turmeric (*Curcuma longa L.*) is an important commercial spice crop grown in India. It is used in various forms like as condiment, flavouring and colouring agent and also as a principal ingredient in Indian culinary as curry powder. It is one of the multi-use products which have many valuable properties and uses. It is extensively used in food, textile, medicine and cosmetic industries [1]. India is the largest producer, consumer and exporter of turmeric in the world, other producers are Thailand, Southeast Asian countries, Central and Latin America and Taiwan. The global production of turmeric is around 11 lakh tones per annum. India dominates the world production scenario contributing (78%) followed by China (8%), Myanmar (4%) and Nigeria and Bangladesh together contributing to (6%) of the global production. India has 222.00 thousand hectares under turmeric cultivation with a total production of 1132.00 thousand tonnes in the yearv2016-17. The area and production of turmeric in India is growing at the rate of 2.62 and 5.67 percent per annum during the period from 2011-12 to 2016-17. Andhra Pradesh, Tamil Nadu, Karnataka and Gujarat constitute (48.03%) share in India's total production [2]. In Gujarat, during the year 2016-17 turmeric crop was cultivated in an area of about 3711 hectares and having production of 73148.53 MT with productivity of 19.71 MT/ha. In Navsari District, during the year 2016-17 turmeric crop was cultivated in an area of about 854 hectares and having production of 19300.40 MT with productivity of 22.60 MT/ha [3].

Methodology

The form of Cobb-Douglas production function is as under.

$$Y= aX1^{b1}X2^{b2}X3^{b3}X4^{b4}X5^{b5}X6^{b6}X7^{b7}X8^{b8}Ui$$

Where,Y=Total returns from turmeric cultivation (Rs/ha)
X1=Area under turmeric cultivation (ha)
X2=Value of seed/seedling (Rs/ha)
X3=Tractor charges (Rs/ha)
X4=Cost on human labour used in turmeric cultivation (Rs/ha)
X5=Cost on chemical fertilizers (Rs/ha)
X6=Cost on farmyard manure (FYM) (Rs/ha)
X7=Cost on plant protection chemicals (PPC) (Rs/ha)
X8 = No of irrigations
b1 to b8=Regression coefficient of respective variable (1 to 8)
Ui=error term

Ethical Approval

Primary data were collected through personal meeting on farmer's field. Hence this particular study did not require ethical approval.

Estimation of marginal value product (MVP)

A neo-classical criterion indicating that marginal value productivity must be equal to or above the unit cost of individual inputs. This criterion was used to examine the input use efficiency. The marginal value productivity of individual resources was estimated by using the following formula.

$$\text{MVP xi} = \frac{b_i \overline{Y}_G * PY}{X_{iG}}$$

Where,
$\overline{Y}_G$ = Geometric mean of output
Py = Price of output (Rs/qtl)
X_{iG}= Geometric mean of ith input
b_i= Production elasticity of ith input

The efficiency of inputs use was studied through the comparison of MVPS of inputs with their marginal costs or acquisition costs. The marginal cost of land has been taken the average rental value of land under the selected crops. The estimated average wage rate for a man day was taken as the marginal cost of human labour. Similarly, the marginal cost of bullock labour includes the average market rate of a bullock pair for a day. The average market prices of manures and fertilizers prevailed during the study year at the village level has been taken as marginal cost of manures and fertilizers. The marginal cost of other inputs taken as cash expenditure incurred for all other inputs together was considered as one rupee since these inputs have been measured in value terms.

Resource productivity and resource use efficiency in turmeric production

Cobb-Douglas production function was estimated on per hectare basis. In the case of overall farmer, the result of the production function for turmeric crop are presented in the results indicated that the coefficient of multiple determinations (R^2) is 0.90. It implies that 90 percent of the total variation in the output of turmeric was explained by the explanatory variables included in the model. The result of the study revealed that the rhizomes (0.32), tractor charge (0.19), human labour (0.80) chemical fertilizer (0.26) and FYM (0.19) were found positive and highly significant at 1 per-cent level. It implies that one percent increase in this variable could increase yield by 0.32, 0.19, 0.80, 0.26 and 0.18 percent respectively. Human labour was found to be the most influential input on yield determination followed by rhizomes, chemical fertilizer, FYM and Tractor & Machinery. However, the plant protection chemical (0.02) and irrigation (0.06) were found positive and non- significant. Similar results were found with [4] in most of the variables.

Table-1 Regression coefficients of different production variables in cultivation of Turmeric for overall farmers

Input variable	Coefficient	Standard error
Rhizomes	0.32**	0.06
	-5.33	
Tractor charge & Machinery	0.19**	0.07
	-2.71	
Human labour	0.80**	0.16
	-5.12	
Chemical fertilizer	0.26**	0.06
	-3.87	
FYM	0.19**	0.05
	-3.8	
Plant protection chemical	0.02	0.03
	-0.52	
Irrigation	0.06	0.04
	-1.8	
R^2	0.9	

Table-2 Marginal value productivity of resource inputs of turmeric for overall farmers

Input variable	MVP	MFC	MVP/MFC
Rhizomes	7.2	1	7.2
Tractor charge	3.94	1	3.94
Human labour	7.31	1	7.31
Chemical fertilizer	5.52	1	5.52
FYM	4.42	1	4.42
Plant protection chemical	0.81	1	0.81
Irrigation	1.82	1	1.82

Marginal value productivity of resource inputs for overall turmeric farmers

It could be seen for overall turmeric farmers, from the [Table-2] that the MVPs of Plant protection chemical was lower than their corresponding unit price the ratio of MVP to factor price of Plant protection chemical (0.81) was less then unity which calls for its underutilization. The underutilization use of the resource would lead to decrease the turmeric production. The MVPs of rhizomes, tractor charge, human labour, chemical fertilizer, irrigation and FYM were the ratio of MVP of input to its price were positive and greater than unity indicating that there is scope to increase the use of these inputs. From the above discussion, it is concluded that, rhizomes, tractor charge, human labour, chemical fertilizer, irrigation and FYM have positive and statistically significant relationship which indicate that an increase in the application of these inputs would lead to increase in the output of turmeric. All the variables except plant protection chemicals were found to be underutilized. Similar results were found with [4].

Conclusion:

The results revealed that the coefficient of multiple determinations (R^2) is 0.90. The result of the study revealed that the rhizomes (0.32), tractor charge (0.19), human labour (0.80) chemical fertilizer (0.26) and FYM (0.19) were found positive and highly significant at 1 percent level. It indicated that human labour was found to be the most influential input on yield determination followed by rhizomes, chemical fertilizer, FYM and tractor & machinery. However, the plant protection chemical (0.02) and irrigation (0.06) were found positive and non- significant. MVPs analysis shows that the rhizomes, tractor charge, human labour, chemical fertilizer, irrigation and FYM have positive and statistically significant relationship which indicate that an increase in the application of these inputs would lead to increase in the output of turmeric. On the other hand, plant protection chemicals were found to be underutilized, it is advised to proper adoption of recommended IPM measures to enhance the turmeric productivity in the study area.

Application of research: research helpful to study the resource use efficiency of turmeric production.

Research Category: Agricultural Economics

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