Journal of Scientific Research and Reports

Volume 29, Issue 12, Page 55-60, 2023; Article no.JSRR.111574
ISSN: 2320-0227

Economic Analysis of Resource Use Efficiency of Turmeric in Erode District of Tamil Nadu, India

N. Kiruthika [a++*], V. Karthick [a++], S. Senthilnathan [a#] and T. Arivelarasan [b++]

[a] Department of Agricultural Economics, Tamil Nadu Agricultural University, Coimbatore, India.
[b] Kaveri University, Telangana, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JSRR/2023/v29i121818

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/111574

Original Research Article

Received: 17/10/2023
Accepted: 24/12/2023
Published: 26/12/2023

ABSTRACT

Turmeric, a golden spice obtained from the rhizome of the plant *Curcuma longa*, has been used to give color and taste to food preparations since ancient times. to increase the productivity of turmeric it's essential to know the resource use efficiency of turmeric. Hence, the present study has taken up with the objective of to analyze the factors affecting yield of turmeric and study the factor use efficiency in turmeric. The study is based on the primary data collected from Erode district of Tamil Nadu. The primary data required for the study were collected through personal interview with the help of a comprehensive interview schedule. Results showed that 96 per cent of the variation in the dependent variable was explained by the independent variables selected for the study. The variables labour and irrigation were significant at one per cent level of probability. The variables quantity of rhizome, quantity of organic manure and quantity of inorganic fertilizer were significant at five per cent level of probability.

[++] Assistant Professor;
[#] Associate Professor;
**Corresponding author: E-mail: kiruthika.n@tnau.ac.in;*

Keywords: Turmeric; erode; resource use efficiency.

1. INTRODUCTION

"Turmeric or *Curcuma longa* is a flowering plant belongs to the family Zingiberaceae. Turmeric, a golden spice obtained from the rhizome of the plant *Curcuma longa*, has been used to give color and taste to food preparations since ancient times. Traditionally, this spice has been used in Ayurveda and folk medicine for the treatment of such ailments as gynecological problems, gastric problems, hepatic disorders, infectious diseases, and blood disorders. Modern science has provided the scientific basis for the use of turmeric against such disorders. Various chemical constituents have been isolated from this spice, including polyphenols, sesquiterpenes, diterpenes, triterpenoids, sterols, and alkaloids" [1].

"Turmeric, a golden spice obtained from the rhizome of the plant *Curcuma longa*, has been used to give color and taste to food preparations since ancient times. Traditionally, this spice has been used in Ayurveda and folk medicine for the treatment of such ailments as gynecological problems, gastric problems, hepatic disorders, infectious diseases, and blood disorders. Modern science has provided the scientific basis for the use of turmeric against such disorders. Various chemical constituents have been isolated from this spice, including polyphenols, sesquiterpenes, diterpenes, triterpenoids, sterols, and alkaloids" [2].

While turmeric is well known for its capacity to preserve food through its antioxidant mechanism, add flavor, and offer food color, its health-promoting properties are less well understood or valued. It was formerly thought to be a digestive aid, an appetite suppressant, and a treatment for jaundice [3].

"Numerous preclinical investigations identified a variety of potential health benefits, including treatment for heart disease, arthritis, Alzheimer's disease, gastrointestinal disorders, and the metabolic syndrome (MetS)" [4]. "India shares around 90 per cent of the global turmeric production. India has more than 333 thousand hectares under turmeric cultivation with a total production of 1222 thousand tones during the year 2021-22. (National Horticulture Board, GoI)" [2].

"Maharashtra topped both in area and production with 102.67 thousand hectares and 367.84 thousand tonnes respectively. Tamil Nadu occupies fifth position with 24.17 thousand hectares with 124.92 thousand tonnes (2021-22). In Tamil Nadu Turmeric is being cultivated traditionally more than 40 years. Erode is a major turmeric belt in the state. This district is well known for turmeric production and turmeric market in the entire country" [2]

"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 efficiency in production of turmeric assumes paramount importance" [5].

In this background, the present study has taken up with the objective of to analyze the factors affecting yield of turmeric and study the factor use efficiency in turmeric production.

2. METHODOLOGY

2.1 Data and Sample Size

The study is based on the primary data collected from Erode district of Tamil Nadu. The primary data required for the study were collected through personal interview with the help of a comprehensive interview schedule. Among the taluks in Erode district, Erode taluk was selected purposively for the present study, since both production and processing are concentrated in this taluk. In Erode taluk, two villages from Kodumudi block and one village from Modakurichi block were selected randomly. Thirty farmers were selected from each block and thus the total sample size is 90. Selected blocks shown in Fig. 1.

2.2 Econometric Analysis

The relationship between yield of turmeric and different inputs was studied using regression analysis. After studying the scatter diagram, Cobb-Douglas production function was fitted for the data collected. The production function was estimated using ordinary least square (OLS) method. The estimated values of the regression coefficients were tested for statistical significance using t-test and F-test. Yield of turmeric per hectare was taken as the dependent variable and other variables like quantity of planting material, quantity of organic manure, quantity of inorganic manure, number of irrigations, number of weeding, cost for plant protection, cost of herbicide were considered as independent variables.

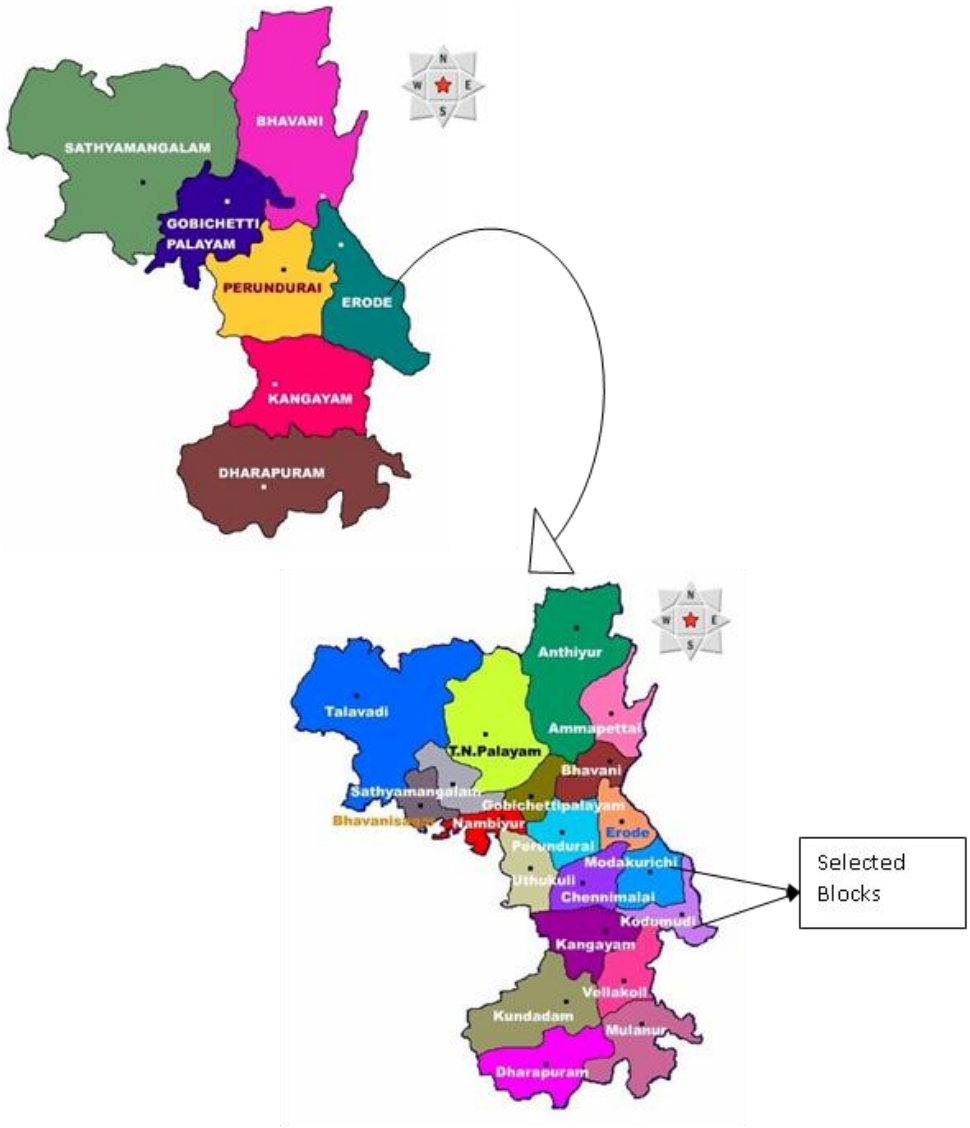

Fig. 1. Map Showing the study area

The form of regression model used was:

$Y = a X_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5} X_6^{b6} X_7^{b7} U_t$

Where,

Y = Yield of turmeric (Quintals)
X_1 = Quantity of planting material (kgs)
X_2 = Labour (man days)
X_3 = Quantity of organic manure (kgs)
X_4 = Quantity of inorganic manure (kgs)
X_5 = Irrigation (numbers)
X_6 = Cost of weed control (in Rs)
X_7 = Cost of plant protection (in Rs)

$a, b_1, b_2, \ldots\ldots b_7$ = Parameters to be estimated
U_t = Error term

The estimated coefficients of significant independent variables were used to compute the marginal value products (MVP) and the resources-use efficiency (r) was worked out using Equation (1) [6]:

$$r = MVP/MFC$$

3. RESULTS AND DISCUSSION

A brief description of the characteristics of the sample farmers are discussed.

3.1 Family Size of Sample Farm Households

The family size of the sample farmers are given in Table 1.

It could be seen from the Table 1 that among the turmeric producers 40 per cent of the households had medium size family with four to five persons per family, 33.33 per cent of the household had less than four members per household and about 26.67 per cent were larger families with more than five persons. The average family size of all sample farms was 3.88 [7-10].

3.2 Land Holding Pattern

Land holding pattern plays an important role in determining farm income, cultivation practices, production efficiency, as well as on marketing of farm produces.

Among the sample farmers, marginal farmers constituted 30 percent, small farmers constituted 34.45 per cent and large farmers constituted 35.55 percent. The average farm size of marginal, small and large farms was 0.89, 1.27 and 3.56 respectively. The average farm size for the sample as a whole is about 2.00 ha [11-14].

3.3 Cropping Pattern of Sample Farms

The cropping pattern followed in the sample farms is presented in Table 3.

It could be observed from the Table 3 that the sample farmers were cultivated turmeric and onion was cultivated as intercrop in the month of July-Aug followed by sorghum in the month of Apr-May. Sugarcane was also cultivated simultaneously started from the month of June-July.

The results of the production function analysis relating yield of turmeric and factors influencing it are given in Table 4.

The results indicated that the R^2 (coefficient of multiple determination) was 0.96 implying that 96 per cent of the variation in the dependent variable (turmeric yield) is accounted by the independent variables selected for the study. The independent variables viz., human labour, and irrigation were significant at one per cent level of probability.

Table 1. Family size of sample farm households

S. No.	Family size	Number	Percentage	Average family size
1.	Small (<4)	30	33.33	3.65
2.	Medium (4-5)	36	40.00	3.89
3.	Large (> 5)	24	26.67	4.10
	Total	90	100.00	3.88

Table 2. Land holding pattern of sample farm households

S. No.	Farm size (ha)	Number	Percentage	Average farm size (ha)
1.	Marginal (<1)	27	30.00	0.89
2.	Small (1-2)	31	34.45	1.27
3.	Large (>2)	32	35.55	3.56
4.	Total	90	100	1.97

Table 3. Cropping pattern in sample farms

S. No.	Sowing Season	Crops	Area in acres (in ha)		
			Marginal farmers	Small farmers	Large farmers
1.	July-Aug	Turmeric	0.6	1.0	1.4
2.	July-Aug	Onion	0.6	1.0	1.4
3.	June-July	Sugarcane	0.3	0.6	1.0
4.	Apr-May	Sorghum	0.2	0.4	0.5

Table 4. Results of Cobb-Douglas production function for turmeric

Dependent variable: Turmeric yield (kg / ha)

S. No	Explanatory variables	Regression coefficient	Standard error	t-value
1.	Constant	0.062651***	0.287295	2.892563
2	Quantity of rhizome (kg)	0.03733**	0.019979	1.998454
3.	Labour (man days)	0.23548***	0.063535	3.706297
4.	Quantity of organic manure (kg)	0.071756**	0.034489	2.080574
5.	Quantity of inorganic fertilizer (kg)	0.043707**	0.0297	2.071639
6.	Irrigation (numbers)	0.204082***	0.025522	7.996205
7.	Cost of weed control (in Rs)	0.005709	0.006748	0.846
8.	Cost of plant protection (in Rs)	0.001807	0.004809	0.375709
R^2 = 0.96		N = 90		
F = 290.38		*** Significant at 1% level		
		** Significant at 5% level		
		* Significant at 10% level		

Table 5. MVP/MIC Ratio for inputs used [2]

S. No.	Inputs	MPP	MVP	MIC	MVP/MIC Ratio
1.	Quantity of rhizome	0.012972	51.88847	10	5.18
2.	Labour	0.055553	222.2136	105	2.11
3.	Quantity of organic manure	0.000373	1.492767	1	1.49
4.	Quantity of inorganic manure	0.008346	33.38547	5	6.67

This implied that an increase in use of labour by one per cent, *ceteris paribus*, would increase yield of turmeric by 0.23 per cent and an increase in number of irrigations by one per cent *ceteris paribus* would increase the yield by 0.21 per cent [15-19].

The regression coefficient for seed material (rhizome), organic manure and inorganic fertilizer used in turmeric cultivation were significant at five per cent level of probability. An increase in organic manure by one per cent *ceteris paribus* would increase the yield 0.07 per cent from the geometric mean level. An increase in seed material applied by one percent *ceteris paribus* would increase the yield by 0.04 percent from the geometric mean level. The variables cost of weed control and cost of plant protection turned out to be non-significant.

The marginal value product (MVP), marginal input cost (MIC) and the ratio between these two were worked out for each input to understand the efficiency of input use. The results are given in Table 5.

“The input is used efficiently if the ration between MVP and MIC is one. A ratio of more-than-one and less-than-one would indicate under-utilization and over-utilization respectively. From the Table 5.13 it could be seen that the ratio was found to be greater than one for quantity of rhizome, quantity of organic manure, labour, quantity of inorganic fertilizer, which indicated the underutilization of these inputs” [2].

4. CONCLUSION

Turmeric is widely used in India, China, and Southeast Asia as a spice, food preservative, and coloring agent. It is also considered auspicious and is used in religious rituals. In view of the economic importance of turmeric in both national and farm economy and the problems faced by farmers in production and marketing of turmeric the present study was taken up with the following specific objective of analyzing the factors affecting yield of turmeric and study the factor use efficiency in turmeric production. Results showed that 96 per cent of the variation in the dependent variable was explained by the independent variables selected for the study. The variables labour and irrigation were significant at one per cent level of probability. The variables quantity of rhizome, quantity of organic manure and quantity of inorganic fertilizer were significant at five per cent level of probability.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Gupta SC, Sung B, Kim JH, Prasad S, Li S, Aggarwal BB. Multitargeting by turmeric, the golden spice: From kitchen to clinic.

Molecular Nutrition & Food Research. 2013;57(9):1510-1528.
2. Kiruthika N. The Economics of Production of Turmeric In India: A Case Study of Erode District of Tamil Nadujj. J. Innov. Res. Solut; 2013.
3. Aggarwal BB, Sundram C, Malani N and Ichikawa H. Curcumin. The Indian Solid Gold. Current Science. 2010;332:16-34.
4. Singletary, Keith. Turmeric: Potential Health Benefits. Nutrition Today. 2020;55(1):5-56.
DOI: 10.1097/NT.0000000000000392.
5. Karthick V, Alagumani T, Amarnath JS. Resource–use efficiency and technical efficiency of turmeric production in Tamil Nadu — A Stochastic Frontier Approach, Agricultural Economics Research Review. 2013;26(1):109-114.
6. Rahman SA, Lawal AB. Economic analysis of maize based cropping systems in Giwa local government area of Kaduna State, ASSET Report Series No. 3, Nigeria; 2003.
7. Achyut Pandey, Shruti Mishra, Anupam Patra, Pallavi Somvanshi, Neel Sarovar Bhavesh, Rupesh Chaturvedi. Role of curcumin's phenolic –OH group in the inhibition of Helicobacter pylori CagA phosphorylation, Journal of Molecular Structure. 2024;1296Part 2.
8. Amarnath JS, Brindha M. A comparative analysis of sustainability in crop and dairy production system In Tamil Nadu, India. Bangladesh J. Agric. Econs. XXXVI. 2013;1&2:35-51.
9. Bhatia GR. Marketing cost and margins of agricultural commodities. Agricultural Marketing, 1996;39(1):8-11.
10. Ganaprakasam A. Contract farming of coleus and turmeric in salem district-an economic analysis. (Unpublished M.Sc. (Ag) thesis, submitted to Tamil Nadu Agricultural University, Coimbatore; 2006.
11. Kerur KM, Basavaraj Banakar HG, Shankara Murthy, Dodmani MT. Efficiency of Sunflower Marketing in North Karnataka. The Bihar Journal of Agricultural Marketing. 1998;6(2):227-237.
12. Kiruthika N. The economics of production of turmeric in India: A case study of erode district of Tamil Nadu. Journal of Innovative Research and Solutions (JIRAS). 2013;1(2):23-30.
13. Ladaniya MS, Vinod Wanjari, Bipin Chandra Mahalle. Price Spread of Pomegranate. Indian Journal of Agricultural Economics. 2004;58(4):800-811.
14. Lal Gupta SB, Salik Ram. Resource Productivity on Paddy Farms in Chandauli block of Varanasi District", Agricultural Situation in India. 1978;33(6)::373-374.
15. Marothia DK, Gupta SP, Chandrakar MR. Vegetables marketing: A case study of two markets in Chhattisgarh Region of Madhya Pradesh. The Bihar Journal of Agricultural Marketing. 1996;4(1):44-50.
16. Mohapatra SC. Production and marketing of onion in Bolangir District of Orissa. The Bihar Journal of Agricultural Marketing. 2001;9(2):25-26.
17. Ram Singh, Alethea Dympep, Passah S, Feroze SM, Choudhury A, Shiv Kumar, Jhajharia A. Value chain analysis of Lakadong turmeric in Meghalaya: a micro-level study. Agricultural Economics Research Review. 2020;33(2):239-249.
18. Shyama Sundar, Srinivasa Gowda MV. Resources Productivity and Allocation Efficiency of Irrigated Onion – An Econometric Analysis. Southern Economist. 1994;33 (11):11.
19. Stein C, J Barron. Mapping actors along value chains: integrating visual network research and participatory statistics into value chain analysis. Colombo, Sri Lanka: International Water Management Institute (IWMI). CGIAR Research Program on Water, Land and Ecosystems (WLE). 2017;24.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/111574