

# An Economic Analysis of Biopesticides Impact on Turmeric Production in Tamil Nadu

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## Introduction

- In India, on an average 33 percent of crop loss occurs due to pests and diseases.
- To enhance the productivity, the pesticides were used at the rate of 0.6 kg/ha in India and overuse of pesticides degraded the soil, polluting the groundwater and creates human health hazards.
- Biological method of pest control is an eco-friendly way to decrease the crop loss.
- Biopesticide is a formulation made from naturally occurring substances that controls pests by nontoxic mechanisms and in eco-friendly manner.
- Biopesticides may be derived from animals (e.g. nematodes), plants (Chrysanthemum, Azadirachta) and micro-organisms (e.g. *Bacillus thuringiensis*, Trichoderma, Nucleopolyhedrosis virus), and include living organisms (natural enemies) etc.
- Biopesticides application at higher level to control rhizome rot and leaf blotch disease in turmeric cultivation.
- Turmeric has been used as medicine for curing many diseases, especially in COVID-19 pandemic situation it is used as immunity booster.

## Aim / Objectives

- To estimate resource use efficiency in turmeric cultivation in the study area
- To study the awareness and adoption of biopesticide usage in turmeric cultivation in the study area

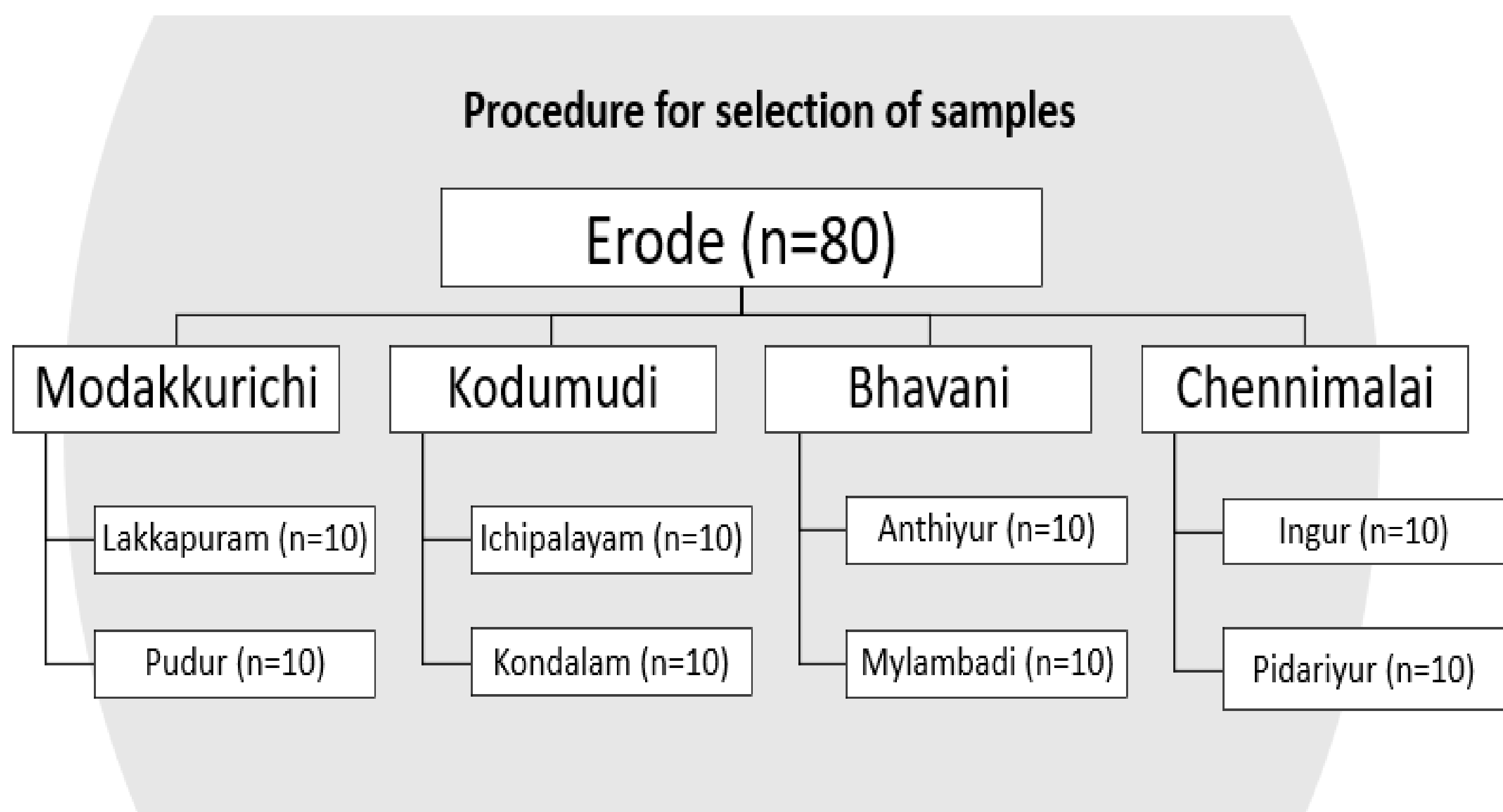
## Methods

**Study area:** Erode District (Western Zone) – Tamil Nadu

**Sample Size:** 80

**Type of Data:** Primary

**Time period:** 2019-20



**Functional analysis** - Cobb-Douglas production function

$$Y = aX_1^{b_1}X_2^{b_2}X_3^{b_3}X_4^{b_4}X_5^{b_5}X_6^{b_6}$$

Y = Crop Yield (Kg/ha)

X<sub>1</sub> = Planting Materials (No./ha)

X<sub>2</sub> = Biopesticides (Kg/ha)

X<sub>3</sub> = Fertilizers (Kg/ha)

X<sub>4</sub> = FYM (t/ha)

X<sub>5</sub> = Machineries (Hrs./ha)

X<sub>6</sub> = Man days of labour (No./ha)

b<sub>1</sub>, b<sub>2</sub>, b<sub>3</sub>, b<sub>4</sub>, b<sub>5</sub>, b<sub>6</sub> = Coefficients of X variables

**Resource-use Efficiency:**

$$r = \text{MVP/MFC}$$

$$\text{where, } \text{MVP}_i = \beta_i \frac{\bar{Y}}{\bar{X}_i} \times P_y$$

MVP<sub>i</sub> = Marginal value product of the i<sup>th</sup> input,

β<sub>i</sub> = Estimated co-efficient (or) elasticity of the i<sup>th</sup> input,

P<sub>y</sub> = Price of output,

$\bar{Y}$  = Geometric mean of the value of output,

$\bar{X}_i$  = Geometric mean of the i<sup>th</sup> input

**Optimal Resource Allocation:**

$$D = (1 - \text{MFC/MVP}) \times 100$$

where, D is the absolute value of percentage change in MVP of each resource.

**Technological Awareness and Adoption Index:**

Technology Awareness and Adoption Index (TAI) was worked out with the help of following formula.

$$\text{TAI} = A_i/M_i \times 100$$

Where,

A<sub>i</sub> = Average awareness/adoption score registered by the farmer for particular component,

M<sub>i</sub> = Maximum awareness adoption score registered by the farmer for particular component.

## Results and Discussion

**Table 1. Resource-use efficiency in turmeric production**

Variables	Regression coefficient	Standard error
X <sub>1</sub>	0.17***	0.047
X <sub>2</sub>	0.09***	0.012
X <sub>3</sub>	0.12**	0.025
X <sub>4</sub>	0.25***	0.023
X <sub>5</sub>	0.33	0.034
X <sub>6</sub>	0.18	0.019

R<sup>2</sup> = 0.71 \*\*\*- Significance at 5 % level \*\* - Significance at 1 % level

**Table 2. Economic efficiency of resource use in turmeric production**

Variables	Regression coefficient	MVP	MFC	MVP/MFC	Percentage adjustment required
X <sub>1</sub>	0.17	45.25	9.25	4.90	79.56
X <sub>2</sub>	0.09	1501.21	501.25	2.99	66.61
X <sub>3</sub>	0.12	357.24	57.25	6.24	83.97
X <sub>4</sub>	0.25	150.14	52.14	2.87	65.27
X <sub>5</sub>	0.33	2014.57	312.54	6.44	84.49
X <sub>6</sub>	0.18	52.25	61.24	0.85	100.00

**Technological Awareness Index:**

$$\text{TAI}_1 \rightarrow 2.9/4 = 72.5\%$$

**Technological Adoption Index:**

$$\text{TAI}_2 \rightarrow 2.54/4 = 63.5\%$$

## Conclusion

- The results shows that the plant materials, biopesticides, fertilizers, FYM were found to positively influencing the yield in the crop production.
- All the resources except human labour are found to be optimally used, especially biopesticides which has to be adjusted 66.61 per cent.
- The technology adoption index is less than awareness index because the farmers would take some time period to adopt the known technology by assessing the success of concern technology.

## References

Karthick V (2013)., "Resource-use Efficiency and Technical Efficiency of Turmeric Production in Tamil Nadu — A Stochastic Frontier Approach", Agricultural Economics Research Review Vol. 26(No.1) 109-114.