

An Economic analysis of Resource use efficiency and Input use Behaviour of Gherkin Growers in Natham Block of Dindigul District, Tamil Nadu

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Abstract

Gherkin is a good source of potassium, calcium, silica, and magnesium which helps to improve overall growth. It is consumed as food in Western countries like the USA. In India, it is grown in contract farming by small and marginal farmers. India contributes to about 15 per cent of the production of the world's gherkin requirements. India's export of gherkins (pickled cucumbers) for monetary yr 2023-24 was 17 per cent with the value of \$256.58 million on sturdy demand from European consumers akin to Germany and Spain. In 2022-23, India's gherkin export stood at \$218.74 million. Knowing the importance of this crop, the present study was carried out to estimate the resource use efficiency of gherkin farmers and to know the level of perception about contract farming. For exploring the issues related to the production of gherkin, Natham block of Dindigul district was purposively selected for the study, since it ranks first in production among all other districts of Tamil Nadu. The perception of farmers was identified using a structured interview schedule on five dimensions such as contract farming, extension, market, economic and social dimensions. The results of functional analysis revealed that among the nine independent variables included, the coefficient of variables for phosphorus, potassium, number of irrigation, number of harvest, human labour and experience influenced the gherkin production positively and significantly. All other variables like FYM, seed and nitrogen had a negative influence. The gherkin growers have poor to high levels of perception towards contract farming. Among the respondents, 72 per cent of them were having moderate level of perception which might be due to the involvement of the gherkin processing company in supplying inputs and procurement of products after harvest. The inputs namely, phosphorous, potassium, and human labour were used less than their economic optimum level in the study area.

Key words : Gherkin, Contract Farming, Resource Use Efficiency, Economic Optimum Level

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Gherkin is a tropical cucurbitaceous climbing plant that originated in India. The word is originated from the Swedish word 'gurka' or the German word 'gurke' which means 'cucumber'. Though gherkin originated in India, the first ever mention of it, in the recorded history, is related to Mesopotamia. It is believed to be the first-ever pickle in recorded history, enjoyed by the people of Mesopotamia around 4500 years ago. Gherkins were thought to be a sacred food of the Yaskxia people of Russia. Gherkins is currently exported to more than 20 countries. The production of gherkins in India is concentrated in the three southern states, viz. Karnataka, Tamil Nadu, and Andhra Pradesh. Karnataka accounts for almost 60 per cent of the total gherkin production and Tamil Nadu and Andhra Pradesh account for 20 per cent each. Contract farming involves agricultural production being carried out based on an agreement between the buyer and farm producers. Sometimes it involves the buyer specifying the quality required and the price, with the farmer agreeing to deliver at a future date. More commonly, however, contracts outline conditions for the production of farm products and their delivery to the buyer's premises. The farmer undertakes to supply agreed quantities of a crop or livestock product, based on the quality standards and delivery requirements of the purchaser. In return, the buyer, usually a company, agrees to buy the product, often at a price that is established in advance. The company often also agrees to support the farmer through, supplying inputs, assisting with land preparation, providing production advice and transporting produce to its premises. The term "out-grower scheme" is sometimes used synonymously with contract farming, most commonly in Eastern and

Southern Africa. In India, cultivation of gherkins is carried out under contract farming by around 90,000 small and marginal farmers with an annual production area of 65,000 acres. Primarily processed Gherkins were exported in bulk packing of 220 Liters of H.D.P.E drums (High-Density Poly Ethylene). Gherkins are usually enjoyed as a side dish or accompaniment with sandwiches, and breads. Sweet gherkin pickles are made by soaking the gherkins in sugar syrup or honey. Gherkins may be added to soups, salads and vegetable stir fry. Gherkin juice contains sodium, potassium and water, which are all important for hydration," says Alyssa Lavy, a registered dietician. Hence, the Present study was carried out with following specific objectives 1.to estimate the resource use efficiency in gherkin production and 2. to know the level of perception about contract farming.

The study was conducted in purposively selected Natham block of Dindigul District, owing to its large area under successful contract farming of gherkin. The data collection was carried out through personal interview using a well-structured and pre-tested interview schedule. A list of gherkin contract farmers was obtained from the contracting companies namely 'Ever Green Export Company' and 'Contract Farming' company. From this list a sample of 100 respondents were selected using simple random sampling technique.

A Cobb-Douglas type of production function was fitted to the collected data to identify the variables which are influencing gherkin production and to analyse the allocating efficiency of resources among gherkin growers in the study area.

The general form of the Production function was $y = ax_i^{b_i}$ where 'xi' is the variable resource, 'y' is the output, 'a' is the constant and 'bi' estimates the extent of the relationship between xi and y and when xi is at different magnitudes. The 'b' coefficient also represents the elasticity of production in the Cobb-Douglas production function analysis. For the preparation of the manuscript relevant literature¹⁻¹⁰ has been consulted.

The function of the following form was fitted for the data collected,

$$Y = ax_1^{b_1} x_2^{b_2} x_3^{b_3} x_4^{b_4} x_5^{b_5} x_6^{b_6} x_7^{b_7} x_8^{b_8} x_9^{b_9} e$$

On linearization, it becomes

$$\log y = \log a + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + b_6 \log x_6 + b_7 \log x_7 + b_8 \log x_8 + b_9 \log x_9 + e$$

Where,

Y = Yield (tonnes)

x₁ = Seed(number)

x₂ = Nitrogen(kg)

x₃ = Phosphorus(kg)

x₄ = Potassium(kg)

x₅ = Number of irrigations

x₆ = Number of harvests

x₇ = Human labor (man-days)

x₈ = Experience in gherkin cultivation (years)

x₉ = FYM (tonnes)

a = Intercept

b_i = Elasticities of production (i = 1 to 9)

e = Error term

The returns to scale were estimated directly by getting the sum of 'b_i' coefficients.

The returns will be increasing or constant or diminishing based on whether the value of summation of 'b_i' is greater or equal or less than unity, respectively. The ratio of the MVP to MFC was calculated for the resources namely seed, manure, fertilizer and human labour. A resource is said to be optimally allocated when its MVP = MFC *i.e.*, marginal value product is equal to marginal factor cost.

The marginal value products (MVPs) were calculated using the geometric mean levels of the variables using the formula. (Ahamed *et al.*, 2009)

$$\text{MVP of } X_i^{\text{th}} \text{ resource} = b_i \frac{\bar{Y}}{\bar{X}_i} \times (P_y)$$

Where,

$\bar{y}$ = Geometric mean yield (tonnes)

$\bar{x}_i$ = Geometric mean of ith variable

b_i = Elasticity of production for ith variable

P_y = Price of gherkin (Rs/tonne)

This analysis was carried out in order to identify the possibilities of increasing gross returns under a given farm situation by examining the MVP/MFC ratio.

The Likert scaling technique was used to analyse the farmers' perception towards contract farming of gherkin in the study area. Statements were prepared for five dimensions like farming dimension, extension dimension, market dimension, economic dimension and social dimension. Each statement is provided with a five-point continuum of strongly agree to strongly disagree with a score of 5,4,3,2,1 respectively for positive statements and 1,2,3,4,5 for negative statements.

The Collected data were analysed and the results were discussed in three sections viz., resource use efficiency, input use behaviour and farmers perception about contract farming.

Resource Use Efficiency :

A Cobb-Douglas type of production function was fitted to the collected data to identify the variables which are influencing gherkin production and to analyse the allocating efficiency of resources among gherkin growers in the study area. The production function was fitted and the results are presented in Table 1.

Table-1. Resource Use Efficiency of Gherkin Production

S. No	Variables	Regression coefficient	P-value
1.	Constant/ Intercept	31.219	
2.	Seed	-0.413	0.4924(NS)
3.	Nitrogen	-0.729	0.6082(NS)
4.	Phosphorous	0.148	0.5053(NS)
5.	Potassium	0.171	0.0269**
6.	Number of irrigation	0.557	0.0386 **
7.	Number of harvesting	0.503	0.0855 *
8.	Human labour	0.676	0.0045***
9.	Experience	0.009	0.0311**
10.	FYM(Kg)	-0.072	0.6889(NS)
R ²		0.67	
Σb_i		0.852	

* Significant at 10 per cent level

** Significant at 5 per cent level

*** Significant at 1 per cent level NS

Non-Significant

For functional analysis, the gherkin yield (tonnes) was taken as the dependent variable. The independent variables comprised of seed (number), nitrogen (kg), phosphorous (kg), potassium (kg), number of irrigation, number of harvest, Human labour(Mandays), Experience(years) and FYM (tonnes). The results revealed that the fitted function was a good fit to the data since 67 per cent of the variation in gherkin yield was captured by the independent variables included in the model. The regression coefficients of resources used by farmers were positive for phosphorous, potassium, number of irrigation, number of harvest, human labour and experience in gherkin cultivation. All other inputs *i.e.*, FYM, seed and nitrogen had a negative influence. However, the results indicated that potassium, number of irrigation, number of harvest, human labour and experience were positively significant. One per cent increase in human labour increased gherkin yield by 0.676 per cent which showed that gherkin is a labor-intensive crop. One per cent increase in the number of irrigation, the number of harvest, potassium and experience increased gherkin yield by 0.557 per cent, 0.503 per cent, 0.171 per cent and 0.009 per cent respectively. Further, it could be observed that the returns to scale *i.e.*, $\Sigma b_i = 0.852$ implies that there were decreasing returns to scale and this might be due to underutilization of resources like potassium and human labour.

Input use Behavior of Sampler Respondents:

Based on the functional analysis results, the ratio between marginal value product and marginal factor cost was calculated to identify the input use behaviour of gherkin

farmers in the study area. The marginal value product of each variable except the number of irrigation, number of harvest and experience were computed by multiplying the marginal productivity of each factor with product price and compared with its marginal factor cost. If the ratio between MVP and MFC is equal to one it will indicate optimal allocation of resources. If the ratio is greater than one, resources are said to be under-utilized and vice versa. The results are presented in Table-2.

Table-2. Input use Behavior of Sampler Respondents

S. No	Input	The Ratio Between MVP and MFC	Behaviour
1	Seed	0.74	Over usage
2	Nitrogen	0.75	Over usage
3	Phosphorous	1.4	Under usage
4	Potassium	1.32	Under usage
5	Human labour	11.69	Under usage
6	FYM	0.001	Over usage

It could be seen from Table-2 that the ratios between MVP and MFC were less than one for seed, nitrogen and FYM which indicated that these resources were overutilized. Similarly, the resources like potassium, human labour and phosphorous were under-utilized in gherkin cultivation. Hence, the yield of the gherkin crop might be increased by increasing the level of under-utilized inputs and by reducing the level of over-utilized inputs. This will lead to the optimal allocation of resources to obtain the economic optimum of input and output.

Perception of Gherkin Growers about Contract Farming :

To identify the perception of gherkin growers about contract farming, five dimensions were used. The growers were asked to factorize each dimension into five different scales. After getting these responses, growers were categorized into three groups having poor, moderate and high perception levels. The results are summarized in Table-3.

Table-3. Perception of Gherkin Growers about Contract Farming

S. No.	Category	Number of respondents	Percentage to total
1.	Poor	12	12.00
2.	Moderate	72	72.00
3.	High	16	16.00
	Total	100	100

It could be observed from Table 3 that the perception of gherkin growers towards contract farming ranged from poor to high level of perception. It is inferred that 72 per cent of sample respondents had a moderate level of perception. This might be because of the involvement of the gherkin processing company in supplying inputs and procurement of products after harvest. Twelve farmers had poor level of perception because of lack of awareness about the economic importance of gherkin cultivation.

The resource use efficiency of gherkin production was discussed for farmers in the selected study area. The independent variables comprised of seed, nitrogen, number of harvest, human labour, experience and FYM. The

results revealed that, the coefficient of multiple determination was 0.67 which indicated that the selected independent variables influenced the gherkin yield by 67 per cent. The regression co-efficients of resources used by farmers were negative for FYM, seed, and nitrogen. The perception of gherkin growers towards contract farming was ranged from poor to high level of perception. The results revealed that 72 per cent of the respondents were having moderate level of perception. The input namely phosphorous, potassium, human labour was used less than its optimum level.

Policy Suggestions :

- Gherkin farming could be more viable and attractive commercial enterprise which improves farmer's socio- economic status and helps in alleviating rural poverty in many areas of Natham block.
- Gherkin growers are provided with sufficient marketing facilities by means of forming Farmer Producer Company to avoid dependency on processing companies.

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