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Research Article

A STUDY ON DETERMINANTS OF YIELD OF PADDY CULTIVATION IN TAMIL NADU WITH SPECIAL REFERENCE TO MADURAI DISTRICT

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ABSTRACT

This study examines the determinants of rice production in the district of Madurai in Tamil Nadu used primary data. The present study aims to analyse the paddy cultivation in different size-level farms and the constraint analysis applied. The constraint anlaysis is applied to find out the problems of the farmers in paddy cultivation. Stratified random sampling method was adopted for this present study. Pre scheduled interview questionnaire was prepared and circulated among the 110 sample respondents. Among the sample respondents 60 farmers came under the category of small farm size and 50 farmers came under the category of large farm size. The collected interview schedule enter in to the MS excel and converted to the SPSS software. It resulted that the overall paddy cultivation is viable one based on the statistical tools. The constraint analysis resulted that the problem is identified. The researcher suggested that the overall paddy cultivation is needed to improve stage.

INTRODUCTION

Paddy is the important food crop in India. India is one of the world's largest producers of white rice and brown rice, accounting for 20 per cent of all world rice production. India exported substantial quantity of both Basmati as well as Non-basmati rice to the world, and import in the same categories were insignificant during 2009-10 and 2016-17 (up to January 2017). Tamil Nadu has a seven per cent share in the total rice production in India. The state has 19 lakh hectares of land under paddy cultivation. In terms of per hectare production, Tamil Nadu is right at the top among all the states with a staggeringly high number of 3900 kg. This is the reason why the state, despite having lesser land under paddy cultivation, is placed fifth in the country in terms of production. Tamil Nadu produced 75.85 lakh tonnes of rice during the 2016.

Production is a process, where by some goods and services called inputs and transformed into other goods and services called outputs. Many types of activities are involved in the production including changes in farms, location and the time of use of products. Each of these changes involves the use of inputs to produce the desired outputs. The farms outputs of products depend upon the quantities of inputs used in production. This relation between input and output can be characterized by a production function. A production function provides information concerning the quantity of output that may be expected when particular inputs are combined in a specific manner. The chemical, physical and biological properties determine the kind and amount of output which will be received from particular combination of inputs.

There are number of previous studies on the agricultural cultivation in Madurai district. Among these studies, the research on paddy cultivation is very limited. The present study is paved the resource use efficiency of input factors models. Hence, the resource use efficiency of input factor is significant in the rural economy of Madurai District. In the study has to attempt the resource use efficiency of input factors paddy cultivation based on the entire sample of farms in Madurai district of Tamil Nadu.

REVIEW OF LITERATURE

Rajkrishna (1964) has estimated the Cobb- Donglas type function on the basis of farm management data for two districts of Punjab for the year 1954-55 to 1956-57. He has fitted a sample linear regression model for examining the relationship between output per labour that the farmers in Punjab have optimally utilised the given resources an the marginal product of each input equal to its acquisition cost. Hanumantha Rao (1965) has used production function to analyse agricultural data. He used Cobb-Douglas Function and relates production with inputs of land and labour. Further, he finds the production elasticity of labour to be higher than that of land in two relatively less fertile regions and a reverse

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situation in the track of Marathwada. Shan kanyan and Sirohi (1971) have made use of Cobb Douglas production function to measure productivity of various agriculture resources in the seed potato farm and to examine the possibilities of increasing returns by reallocation of existing resources within seed potato and Maine crops. Salini (1979) in her study has estimated unrestricted from of Cobb Douglas function by the method of ordinary least squares to evaluate the efficiency of farmers in north- western India. Junakar (1980) tested the joint hypothesis of profit maximising behaviour and competitive behaviours of Indian farmers. The study was based on cross sections data pertaining to paddy growing farmers of Thanjavur district in Tamil Nadu, for 1969-70. Kalirajan (1981) studied the economic efficiency of farmer groups using profit function along with four variable input demand equations relating to labour, chemical fertilizer, pesticides and bullock pair.

METHODOLOGY

The following methodology is adopted to study the above objectives. The present study extends over Madurai district of Tamil Nadu. A stratified random sampling design was used. As it is generally believed that the technology was sizebased, the list of farmers was further divided into two categories of farms defined as under;

0.00	acres	5.00 acres: Small farms
5.01	acres and above	5.00acres: Large farms

From the sub-divided list of farmers were selected from each district for preparing a sample of 110 farmers. Data was collected for the explanatory and explained variables with the help of stratified random sampling method through personal interviews of the farmers selected. Among the sample respondents 60 farmers came under the category of small farm size and 50 farmers came under the category of large farm size.

The double log linear regression model of Cobb-Douglas type is adopted to estimate the important factors determining the yields for two farm size small and large farmers. In this regression model, yield is considered as a dependent variable and input factors namely, (i) human labour per acre in Rs. 2) seeds in Rs. (3) organic manure in Rs. (4) fertilizer per acre in Rs., 5) pesticides per acre in Rs., (6) interest on working capital pre acre in Rs. are included as independent variable.

The following form of multiple linear regression model is fitted for the study of determinants yield.

$$\text{Log } Y = \beta 0 + \beta 1 \log X1 + \beta 2 \log X2 + \beta 3 \log X3 + \beta 4 \log X4 + \beta 5 \log X5 + \beta 6 \log X6 + U$$

Where,

Y = Yield per acre in Rs.
X1 = Human Labour per acre in Rs.
X2 = Seeds per acre in Rs.
X3 = Organic Manure per acre in Rs.
X4 = Fertilizer per acre in Rs.,
X5 = Pesticides per acre in Rs.,
X6 = Interest on Working Capital per acre in Rs.,
U = disturbance term with n (0, σ2)

The above equation model is estimated by the principle of least squares method.

Constraints Analysis

In order to find out the major yield constraints to attain potential yield at farm level, Garrett's ranking technique is used for this analysis. The sample farmers are requested to analyse the major constraints confronted by them in realisnig the potential yield at farm as per priority. The rank assigned to each constraint by the sample farmers was converted into per cent position by using the formula.

$$\text{Per cent Position} = \frac{100\,(Rij - 0.5)}{Nj}$$

Where,

Rij = Rank given by the jth farmers the ith variable.
Nj = Number of variables ranked by the jth farmers.

The per cent position of each ranks thus obtained was converted into scores, by referring to the Garrett's ranking table. The scores of all respondents for each factor was then added together and was divided by the number of respondents experiencing that particular constraints. The mean scores of each factors thus ascending arrived at were arranged in a decending order to the corresponding ranks allotted.

Farm-wise Analysis

A perusal of table 1 indicates the estimated linear regression analysis for small, large farmers and total farmers of paddy cultivation in Madurai District. Regression co-efficient results for small, large and total farmers in Madurai district in the following table.

Table 1 Regression Results for small, large and total Farmers in Madurai District

Variables	Small Farms	Large Farms	Total Farms
Intercept	1.3266	8.2406	1.3934
Log X_1	0.4591* (2.961)	0.2144 (1.796)	0.4295* (4.264)
Log X_2	0.0996 (0.988)	-0.2048 (-0.322)	0.0984 (1.745)
Log X_3	0.4415* (2.736)	0.1112 (1.208)	0.2232* (2.474)
Log X_4	0.1543 (1.076)	0.2341* (2.604)	0.1613* (1.927)
Log X_5	0.0421 (0.433)	-0.0559 (-0.673)	0.0920 (1.672)
Log X_6	0.1047 (0.496)	0.3607* (1.977)	0.0960 (1.641)
R^2	0.2840	0.1994	0.6383
F-Value	4.9012	3.0347	33.0706
No. of Observation	60	50	110

Note: Figures in parentheses represent 't' values.
* Indicate significant at 5 per cent level.

In the case of total farmers all the given independent variables have a positive impact on yield and it explains about 63.8 per cent of the variations in yield. The human labourers, organic manure and fertilizer are significantly related to the dependent variables. The human labour is the most influential factor, indicating that one per cent increasing in the factor results in yield. The coefficients of organic manure and fertilizer are statistically significant at five per cent level, thus indicating that one per cent increase in these factors could increase yield per acre by 0.22 per cent and 0.16 per cent respectively. The overall regression model emerged statistically significant at five per cent level (F – value 33.07).

In respect of large farmers among the six variables, there are four variables have positive impact on yield such as human labour, organic manure, fertilizer, and interest on working capital. The remaining, two variables seeds, and pesticides had negative impact on yield. In respect of fertilizer one per cent increase in the variable could increase yield per acre by 0.23 per cent. Similarly interest on working capital is increased by one per cent, that factor results in 0.36 per cent increase in yield. As far as seeds and pesticides, they had negative impact on yield. The reason for negative impact is that the large farmers are ready to spend more money for paddy cultivation Rs.9371.08 for large farmers and Rs.8861.13 for small farmers).

In the case of small farmers all independent variables had positive impact on yield: human labour, organic manure are significantly related to the dependent variable that is, the human labour is the most influential factor, indicating that one per cent increasing in the factor results in 0.46 per cent increasing in yield. Second important yield determinates is organic manure, that is one per cent increase in the factor the resulted in by 0.44 per cent increasing in yield. The overall regression model emerges statistically significant at 5 per cent level (F- Value 4.90).

Cultivation Problem of Sample Respondents

The researcher has been informed by the farmers who have identified five major agro-biological problems in paddy cultivation and ranks were worked out and shown in table 2.

Table 2 Cultivation Problem of Sample Respondents

Sl. No.	Problems	Total Score	Mean Score	Rank	No. of Respondents	Total No. of Respondents
1.	Soil fertility	6948	72.4	II	96	110
2.	Water scarcity	8092	73.5	I	110	110
3.	Fertilizer	4487	60.6	IV	74	110
4.	Pesticides	5200	65.0	III	80	110
5.	Labour	2024	32.1	V	63	110

Source: Survey data

Water scarcity is identified as the most important cultivation factor affecting paddy cultivation. Second major problem is low level of soil fertility. Those affecting soil fertility not only depends upon higher level of using fertilizer but also depends on low level of rain fall, soil erasion and severity of pesticides it will affect the crop yields. Since, pesticides is ranked as the major problem, the natural farming is not possible. So, fertilizer is ranked as fourth important problem. The last problem encountered is labour.

Problem Related with Socio-Economic Factors

The ranks worked out for six key factors hindering the paddy cultivation as expressed by farmers are given below in table 3.

Table 3 Socio-Economic Problem

Sl. No.	Problems	Total Score	Mean Score	Rank	No. of Respon-dents	Total No. of Respon-dents
1.	Inadequate of seeds	7057.60	69.2	II	102	110
2.	Lack of finance	3315.02	39.5	IV	84	110
3.	Non-availability of Agri-market information	5391.10	56.2	III	96	110
4.	Absence of technical guidance	2384.80	38.5	V	62	110
5.	High cost of chemical and fertilizer	8376.20	76.1	I	110	110
6.	Ignorance of modern methods	2025.70	34.9	VI	58	110

Source: Survey data.

High cost of chemical and fertilizer is identified as the most important economic factor, affecting paddy cultivation. Second major problem is inadequacy of seeds. Non-availability of regional market information is ranked as the third important factor which affects paddy cultivation. Among these socio-economic problems the lack of finance is the major important factor which is ranked as fourth. Lack of modern knowledge about production of paddy cultivation and ignorance of modern methods is ranked as the fifth important factor. Lastly, absence of technical guidance is identified as the most important socio economic factor affecting paddy cultivation.

CONCLUSION

The present paper analysis has been classified in two parts that is production fuction and constraint faced by the farmers in Madurai District. The present analysis reveals the inappropriateness of the production functions for the analysis of input variables use behavior of cultivators. The irrationality of inputs use behavior of cultivators may be influenced by the factors such as complementarily of input use, risk-preferences of cultivators, expectations regarding profits, asset position of cultivators, availability of information, availability of finance etc. Hence, by providing financial assistance and establishing agricultural information centres for proper utilization of input variables by farmers may increase the paddy production

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