Research Paper Economics

Organic Verses Inorganic Paddy in Hilly Zone of Shimoga District: is There Any Shift in the Production Function?

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ABSTRACT

Many research studies have compared the crop yield between Inorganic Farming System (IFS) and Organic Farming System (OFS) and they reported the mixed results. In this backdrop this study made an attempt to empirically verify the shift in the production function of IFS over the OFS. Primary data has been collected from 128 sample farmers using multistage stratified random sampling method. Cobb-Douglas Production function was fitted to the data.The coefficient of determination (R2) value reveals that about 75 percent of variation in the paddy yield has been explained by the selected independent variables. The cobb-Doulas production function is a good fit to the data set.The results of the study reveal the fact that there is no upward shift in the production function of IFS over OFS.The coefficient of production function was found to be highest for labour followed by plant nutrients.

KEYWORDS Organic Farming, Paddy

1. Introduction

Paddy, at present, could be produced either through the organic farming practices or through inorganic farming practices.Inorganic farming practices involve the use of High Yielding Verity (HYV) seeds and its associated farming practices like use of chemical fertilizers, pesticides, herbicides and so on.Whereas organic farming practices refers to the use of local variety seeds and its associated farming practices like use of organic plant nutrients, organic plant protection measures and etc. The former could be called as Inorganic Farming System (IFS) and the latter could be called as Organic Farming System (OFS). IFS in general HYVs in particular have been introduced in Indian agriculture sector during 1960s. Since their introduction, Governments at different level have been encouraging the farmers to use the HYVs in different crops. The degree of HYVs adoption varies across the regions. The degree of HYVs adoption is more in the areas where agro climatic condition is suitable for HYVs. If the agro climatic conditions are not suitable for HYVs farmers are continuing with their traditional verities of seeds.

It is found that IFS over the years burns the soil organic matters and soil microorganisms, rendering soil lifeless and infertile, spoiling the soil structure and soil health, depleting soil micro nutrients and natural fertility; this has resulted in stagnant and declining yield, production and income from the crops (Sharma, 1991). The damage caused through agro chemical pollution to environment and human health, directly and through the human food chain is irreparable (Guan Soon, 1998). Four decades down the line, there is a fear still, but with an ironical twist; more has brought in more problems. Soil and water have been poisoned, challenging India's food security all over again (Dasgupta, 2000). Therefore, in recent decades government policies are encouraging the farmers to adopt the OFS. Many research studies have compared the crop yield between IFS and OFS and they reported the mixed results. Hence, this research is an attempt to know; is there any shift in the production function of IFS over the OFS?

2. Methodology

It is widely reported that the agro climatic condition of Hilly Zone (HZ) in Shimoga district is not favorable for the IFS in paddy. Therefore, still a good number of farmers are not willing to adopt IFS and those who adopted have not found significant improvement in the paddy productivity. The details of HYV and Traditional Paddy growing area in Shimoga District is given in table-1. In this backdrop, HZ of Shimoga district has been purposively selected for this study. Sagara, Soraba, Hosanagara and Thirthahalli taluks are coming under this zone. Multi-stage stratified random sampling was used to select the sample respondents. In the first stage, all the four taluks of the Zone were selected. In the second stage, lists of paddy growing villages were prepared separately for all the taluks. Two villages were randomly selected from each list. Farmers of selected villages in the third stage were stratified into two group namely small farmers and large farmers. Farmers who were cultivating two or less than two hectares were considered as small farmers whereas farmers who were cultivating more than two hectares of land were considered as large farmers. Eight farmers from each stratum were randomly selected from each village. Thus, totally 128 farmers have been selected through multistage stratified random sampling method.

Table-1: HYV and Traditional Paddy in Shimoga District.

Variety	Paddy area in hectare (During Kharif 2001-02)		
	STZ	HZ	Overall
HYV	51818 (90.35)	41237 (55.73)	93055 (70.85)
Traditional	5533 (9.65)	32758 (44.27)	38291 (29.15)
Total	57351 (100)	73995 (100)	131346 (100)

Note: Figures in Parentheses are percentage to total paddy area.

Source: District Level Report of Crop Area Statistics, 2001-02, DSO, Shimoga.

Primary data have been collected from the sample respondents using the pretested well-structured scheduled specifically prepared for this purpose. The Primary data has been collected during 2007-08. Cobb-Douglas type of production function used for the study is specified as follows:

$Y = A_1 X_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} e$

Where, Y, X_1 X_2 X_3 and X_4 stands for per hectare yield of paddy in quintals, per hectare expenditure on seeds, expenditure on plant nutrients, expenditure on plant protection chemicals, expenditure on labour (human and bullock) in rupees respectively. $A_1$and e indicate the intercept and error respectively. The elasticities of the respective inputs are indicated with b_is.

Cobb-Douglas type of production function specified above was converted into log linear form and the parameters were estimated by using the Ordinary Least Square (OLS) technique. Statistical significance of the estimated regression co-efficients were tested by using the t test at the chosen level of probabilities. R^2 values were calculated to measure the goodness of fit of these functions. Overall significance of the regression equations were tested through the ANOVA. In order to examine the shift in the production function in IFS over OFS, the technology dummy variable D_1has been incorporated. The value '0' is assigened for OFS and the value '1' is assigned for IFS. Therefore,If the coefficient of D_1 is significantly positive, it could be inferred that there is upward shift in the production function with respect to IFS over OFS.Similarly water management dummy variable D_2 has been incorporated to analyse the impact of effective water management on paddy yield. In this variable, the value '0' is assigned for the farmer who could not effectively manage the water and the value '1' otherwise. If the coefficient of D_2 is significantly positive, it could be inferred that effective water management has significant positive influence on the paddy yield.Log-linear form of production function used for this study is as follows:

$\ln Y = \ln A_1 + a_1 D_1 + a_2 D_2 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + e$

3. Results and Discussion

The details of parameters of Cobb-Douglas type of production function estimated for the sample farmers of HZ of shimoga district are given in table-2. The coefficient of determination (R^2) value reveals that about 75 percent of variation in the paddy yield has been explained by the selected independent variables. The cobb-Doulas production function is a good fit to the data set. The overall production function is found to be statistically significant as the calculated F value (59.674) is significant at 1 percent probability level. The most significant fact is the coefficient of technology dummy is statistically insignificant. Hence there is no significant shift in the production function of IFS over the OFS. This signifies the fact that IFS has not brought any improvement in the paddy productivity in the study area. Paddy in OFS is as productive as in IFS. The coefficient of water management dummy is found to be statistically significant at one percent probability level. It means the farmers who are able manage the water efficiently are able get better paddy yield compared the other farmers no matter whether they are using IFS or OFS. In majority of farmers' field in this zone efficient water management is a very difficult task due to the hilly land scape. Nutrient management is a very difficult due to leaching nutrients in the flood. This is the main reason for non-adoption of IFS. The prevailing paddy growing practices is organic by default.

Table-2: Paddy Production Function for Sample Farmers of HZ, Shimoga

Sl. No.	Particulars	Production Function Values
1	Intercept	-5.019 (-4.317)*
2	Technology (verity) Dummy	0.048 (1.462)
3	Water Management Dummy	0.232 (7.288)*
4	Expenditure on Seeds	0.208 (2.342)**
5	Expenditure on Plant Nutrients	0.237 (5.359)*
6	Expenditure on PPC	0.007 (1.140)
7	Expenditure on Labour	0.553 (5.409)*
8	Coefficient of Determination (R^2)	0.747
9	'F' Values	59.674
10	Number of Observations (n)	128

Note: 1. Figures in Parentheses are calculated 't' values
* and ** indicate sig+nificance at 1 and 5 per cent level respectively

The coefficient of production function was found to be maximum for labour (0.553) followed by plant Nutrients (0.237). These coefficients are found to be statistically significant at one percent probability level. Every one percent increase in expenditure on labour (human labour and bullock labour together) leads to 0.55 percent increase in paddy yield. Similarly one percent increase in the plant nutrient brings 0.23 percent increase in paddy yield. Expenditure on seeds is having positive impact on the paddy yield whereas the expenditure on PPC is not having significant influence. It might be because major portion of paddy crop in this zone is organic by default in which PPC measure is not crucial.

4. Conclusion

Water management is having greater influence on the paddy yield. The farmers who are able to manage the water in an optimum level could get better paddy yield compared to the farmers who are not able to manage the optimum water level in the paddy field. The most significant fact is that there is no shift in the production function of IFS over OFS. IFS will not bring upward shift in the production function. The agro climatic condition is favorable for OFS and major portion of paddy crop is organic by default. Only thing is farmers have to get the due price for their product through proper certification process. The coefficients of Labour and plant nutrient are positive and statistically significant. Their higher use could still bring better yield.

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