accumulation of the insecticide in the cells of BGA results in longer persistence of the insecticide. Apart from sewage sludge other amendments also accelerated the degradation HCH. The results showed that the degradation was greatest in sewage sludge, closely followed by dried leaf litter and dried parthenium in descending order. The present investigation revealed that the degradation of r-HCH in the presence of BGA in soil-water system ws found to be very slow and the chemical persisted in considerable amount even after 70 days of application. However, when applied along with sewage sludge (used as an amendment) the degradation was faster.

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RICE PRODUCTIVITY IN TAMILNADU - AN ECONOMETRIC ANALYSIS.

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ABSTRACT

The present paper intends to study the rice output supply and factor inputs (labour, fertilizer and bullock) demand by using Unit-Output-Price profit function. In order to fulfill the objectives, 80 respondents were selected randomly. The study was conducted in Kaveripattinam block of Dharmapuri district, North- Western zone of Tamilnadu. It is lucid from the study that the rice supply responds to its own price but inelastically. Rice supply has inverse relationships with price of labour and bullock power and positive relation with price of fertilizers. Also, it is evidenced from the study that the own price elasticities of labour and bullock power are negative, support the neo-classical theory of demand. Hence, one could possibly to conclude that by suitable price policy, as a major instrument, rice productivity and factor absorbtion in agriculture could be increased.

Rice is the principal food for most of Indian population. After the introduction of green revolution, there has been a spectacular increase in the production of rice in the state. Since, rice is a staple food, the increase in rice production does not cope up with the increase in population growth. Also, there is a stable increase in demand for inputs, though it is a non-remunerative. Wide spread adoption of high yielding varieties has significant and positive influence on the application of inputs. However, the price of rice shows a stagnant trend. With this in view, the present study is aimed to study the supply response and input demand of rice in response to changing prices of rice and other key factor inputs.

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Table 1. Estimates of UOP profit function and factor demand functions

Variables	Parameters	Restricted estimates
UOP Profit Function :		
Constant	a0	0.2858 (0.801)
Normalized wage rate	b1	-0.0254* (-3.510)
Normalized fertilizer price	b2	0.0583 (0.861)
Normalized price of bullock	b3	-0.8167* (-3.884)
Land	a1	0.3214* (4.523)
Capital	a2	0.9795* (7.570)
Labour demand function	b1	-0.0254* (-3.510)
Fertilizer demand function	b2	0.0583 (0.861)
Bullock demand function	b3	-0.8167* (-3.884)

Note : a. Figures in parentheses indicate estimated 't' values
b. Significance level of 't' values * = $p < 0.01$

Though, there are number of studies available on the supply response for rice to changes in inputs level, studies on supply response and input demand with respect to changing prices are limited. Supply response is studied conventionally using time series data and the quantity supplied is regressed on price, allowing for the various lags and shifters in the model. Supply response can be studied using cross section data by programming approach and functional approach. Since, the programming approach needs more accurate information, it will be better to go for functional analysis using cross section data. Output supply and input demand are parts of general system. The estimation of output supply alone gives inefficient estimates of the supply relationship. Therefore, it is necessary to estimate output supply and inputs demand equations simultaneously. Keeping this in view, in the present study, the Unit-Output-Price (UOP) profit function approach has been applied to study the output supply and input demand.

ANALYTICAL FRAMEWORK

To study the output supply and inputs demand for rice, 80 respondents were selected randomly. The study was conducted in Kaveripattinam block of Dharmapuri district, North-Western zone of Tamilnadu. The data related to the year 1991-92.

Following Lau and Yotopoulos, the UOP profit function model is used for the present study. For the purpose of estimation the normalized profit function corresponding to Cobb-Douglas production function with three variable inputs equations are specified.

In the context of the present study, the Cobb-Douglas type of production function specified as follows.

$Y = ao\ Labour^{b1}\ Fertilizer^{b2}\ Bullock^{b3}\ Land^{a1}\ Capital^{a2}$ .... (1)

Table 2. Estimates of output supply inputs demand elasticities

Exogenous Variables	Endogenous Variables			
	Output supply	Labour demand	Fertilizer demand	Bullock demand
Price of rice	0.7838	1.7838	1.7838	1.7838
Real wage	-0.0254	-1.0254	-0.0254	-0.0254
Real price of fertilizer	0.0583	0.0583	-0.9417	0.0583
Real price of bullock	-0.8167	-0.8167	-0.8197	-1.8167
Land	0.3214	0.3214	0.3214	0.3214
Capital	0.9795	0.9795	0.9795	0.9795

Taking logarithams,

$1n\,Y = \ln^{a0} + b1 \ln labour + b2 \ln Fertilizer + b3 \ln Bullock + a1 \ln Land + a2 \ln capital$ ....(2)

where the labour, fertilizer and bullock are the variable inputs and the factors land and capital are the fixed inputs. The coefficicents b1,b2,b3, a1 and a2 are the partial elasticities of production.

The normalized UOP profit function specified as:

$$\pi^* = a0\, W^{b1}\, F^{b2}\, B^{b3}\, Land^{\,a1}\, Capital^{\,a2} \quad ...(3)$$

Taking logarithms.

$$In\ \pi^* = In\ a0 + b1\ In\ W + b2\ In\ F + b3\ In\ B + al\ In\ Land + a2\ In\ Capital \quad ...(4)$$

$$\frac{-\ W\ Labour}{\pi^*} = b1 + U1 \quad .... (5)$$

$$\frac{-\ F\ Fertilizer}{\pi^*} = b2 + U2 \quad ....(6)$$

$$\frac{-\ B\ Bullock}{\pi^*} = b3 + U3 \quad ....(7)$$

Where,

π^* = Normalized profit (Current revenue less total variable cost, divided by price of output).

W = Normalized wage rate (Wage rate divided by price of output).

F = Normalized price of fertilizer.

B = Normalized price of bullock power.

Land = Area under rice in hectares.

Capital = Fixed capital services in rupees,

Labour = Total labour utilised in kgs.,

Fertilizer = Total quantity of fertilizer used in Kgs.,

Bullock = Total bullock pair days and

Ui = Random disturbances

a0, bl, b2, b3, a1 and a2 are the parameters to be estimated.

The UOP profit function and input demand functions are estimated jointly by Zellner's Seemingly Unrelated Regression Estimate (SURE) which provides asymptotically more efficient estimates than the production function by Ordinary Least Squares (OLS).

RESULTS AND DISCUSSION:

The estimate of UOP profit function and the input demand functions are presented in Table.1. It is evidenced from the table that the normalized price of variable inputs, labour and bullock show significant negative influence on the profit. The price of fertilizer shows a positive influence with the profit. This positive relationship may be attributed due to the fact that the increased application of fertilizer help maximise yield and there by profits. On the other hand, the fixed factors, capital and land significantly influence the profit on the expected positive line.

The own and cross price elasticities of inputs demand and elasticities with respect to supply of rice are presented in Table.2. It could be seen from table that_th outnut supply elasticity with respect to price of rice is 0.7838. It indicates that the supply of rice would increase by 7.8 per cent in response to a 10 per cent increase in the price of output. An increase in the prices of real wage and bullock power result a fall in the output supply. Similarly, a rise in the prices of fertilizer and the fixed factors (1and and capital) lead to increase in the output supply. The positive sign for the prices of fertilizer implies the adjustment of farms towards price rise and there exists scope to increase use of quantity of fertilizers.

The variable inputs (1about, fertilizer and bullock power) demand are sufficiently elastic to the change in the price of output. A 10 per cent increase in the price of yields 17.8 per cent increase in the demand for all the three variable inputs.

It is seen from the Table.2 that the own price elasticities of the variable input labour, fertilizer and bullock power show a expected negative relation. This supports the neo-classical theory of demand that as price increases, the quantity demanded decreases. Among the inputs, the demand for labour and animal power are elastic and fertilizer has inelastic demand showing the importance of this factor for rice production (Table.2).

Cross price elasticity of variable input labour, with respect to bullock power shows a negative response and positive response with respect to the fixed factors (land and capital). The variable input fertilizer shows a negative response with respect to real wage and real price of bullock power and positive response with the quantities of fixed factors. Similarly, the cross price elasticity of bullock power shows a negative response to the real wage and positive response to the fertilizer and fixed factors land and capital. The positive response of fixed inputs with variable factors show that they are technically partial substitutes in the short-run.

SUMMARY AND CONCLUSION

Rice supply and input demand elasticities are estimated using UOP profit function analysis for a sample of farmers in Kaveripattinam block of Dharmapuri district, North-Western zone of Tamilnadu. It is revealed from the analysis that the output supply responds to own price but inelastic. An increase in the prices of variable inputs labour and bullock power resulted in a fall in the output supply and increase in the output supply with increase in the quantities of fertilizer and fixed factors. The own price elasticities of variable inputs show inverse relationship with their demand supporting the noe-classical theory of demand. All the variable inputs show a elastic response to the price of output. It is to be noted that output price policy is the major instrument to increase rice productivity and factor absorbtion in agriculture as evidenced from the study. Along with an incentive price policy, the adoption of appropriate mechanical and chemical technology, optimal package of strategies, and improving non-economic factors such as social structure can have favourable effects on rice productivity.

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