ECONOMIC ANALYSIS OF AGRICULTURE IN SOUTHERN PARTS OF COASTAL INDIA

NANDHINI U. S, ALAGUMANI T., SHIBI S.

Abstract

Rice - the most important food crop for human consumption is the staple food for nearly half of the world population. The highest productivity level of 4,912 kg/ha was in Dindigul district of Tamil Nadu and the lowest of 283 Kg/ha in Dungarpur district of Rajasthan. The area under Rice is 22.36 lakh ha in Tamilnadu, which is one of the leading rice growing states in India. . Now-a-days most of the cultivable lands are kept fallow due to scarcity of inputs and scanty rainfall and majority of the population were living under poverty condition. To overcome instability in the income of the farmers, appropriate farming systems needs to be developed.

Key words: Resource use efficiency, Cost and Returns, Cobb-douglas production function.

INTRODUCTION

Agriculture in India is the livelihood of the poor, which employs more than half of its people with the highest proportions in the poorest areas and benefits directly millions of poor households in the farms of better family and nutrition, more cash for children's education, extra income to reinvest in developing the farm enterprise and lower food prices for consumers. Today India is one among the fastest growing Democratic Market Economy; well on it's way to be integrated with the world economy. The famous Goldman Sachs report (Dreaming with BRICs: The Path to 2050) states that, among Brazil, Russia, India and China, India will grow the fastest over the next 30 to 50 years by leveraging its demographic advantages and through continued development. India's GDP will exceed Italy's in 2016, France's in 2019, Germany's in 2023 and Japan's in 2032 and India is expected to become the 3rd largest economy in the world by 2032.

Rice - the most important food crop for human consumption is the staple food for nearly half of the world population. It continues to play vital role in the international food grain supply. Rice is the staple food of 65 per cent of the Indian population. The country will need to add about 2.5 million tonnes of milled rice every year to sustain the present level of food sufficiency. In India rice contributes 43 per cent of total food grain production and 46 per cent of total cereal production.The main rice production areas in India are West Bengal, Uttar Pradesh, Madhya Pradesh, Orissa, and Bihar. The highest productivity level of 4,912 kg/ha was in Dindigul district of Tamil Nadu and the lowest of 283 Kg/ha in Dungarpur district of Rajasthan. It is estimated that India produced 73.8 million tonnes of rice in 2005 and 2006, and the government is targeting 129 million tonnes by 2011 and 2012. A wide variation in productivity is due to varied agro-climatic conditions in which rice is grown and also the level of inputs used. Among various inputs seed, water and fertilizers including organic manures are critical ones and have direct influence on the productivity. The problems/constraints in rice production vary from state to state and area to area. The major rice growing areas are concentrated in Eastern region and this region generally experiences high rainfall and severe flood almost every year. The loss to the rice crop is considerably very high. Besides, in upland areas the crop gets setback either from high rainfall or drought condition.

Tamil Nadu is one of a few Indian states where early green revolution technologies were adopted rapidly in the 1960s and 1970s – especially for rice crop. Agriculture continues to be the prime mover of the state economy supporting 60 percent of the population and contributing 13 percent of the state income in 2004-05 In Tamil Nadu crop loss often occurs invariably in the state because of either drought or flood. The crop loss due to drought was mainly attributed to the vagaries of monsoon and lack of timely release and mandated quantum of water from neighbouring Karnataka state during water crisis in the state in consecutive three-year period (2001-2004). Total area sown and production of the crops like paddy and cotton during rabi season affected by drought was of the order of 2.69 lk ha and 12.12 lk tonnes with the result the value of loss of these crops was to the tune of Rs.668.24 crores during 2003-04 in the state.

Decline in area and increase in yield has been the phenomenon observed in almost all Rice production environments however, the 1990s have witnessed negative yield growth for rice in Tamil Nadu. On demand side, Tamil Nadu is still marginally a deficit state in food front. It draws about 1.5 million tonnes of rice. However all the districts of Tamilnadu fall under the high productivity group of productivity classification. It is raised in 34.16 per cent of the gross cropped area of the state. The area under Rice is 22.36 lakh ha in Tamilnadu, which is one of the leading rice growing states in India. This agricultural production in

coastal areas varied considerably due to many factors and the agricultural environment in these coastal communities is facing severe problems primarily due to the rapid degradation of coastal ecology, economic and environmental pressures like scarcity of freshwater, scarcity rainfall, reducing levels of groundwater, increasing soil salinity and loss through erosion which leads to poverty and migration.

METHODOLOGY

The study was conducted in Ramanathapram district. It is a coastal district with a geographical area of 4,233.44sq.km and falls under southern zone of Tamilnadu.Agricultural production in these areas is very poor due to irregular rainfall distribution which in turn affected the cropping pattern, income, employment and standard of living of people. In this district, paddy is the main food crop cultivated in more than 63 per cent of the net area sown. Apart from this coconut is the other main crop cultivated. As Ramanathapuram area comes under very backward area among all the 11 districts of coastal area, an in-depth study was made to analyze the agricultural performance.

Objectives

1. To analyze the economics of agriculture in the coastal ecosystem
2. To evaluate the resource use Efficiency in crop production
3. To identify the constrains faced by the farmers

Sampling Procedure

Ramanathapuram district was selected purposively for this study. The coastal blocks viz., Ramanathapuram and Thirupullani were selected purposively. For the study, the area was divided into region I and region II.

Region I represents the area les than 5 km from the Coastal line.

Region II represents the area more than 5 km from the Coastal line.

From each block 30 farmers to represent Region I and 30 farmers to represent Region II were selected. Thus the sample size was 120 Size of the operational holdings was analyzed from 120 farmers.

Tools of Analysis

Cost of Production was worked out to find out the economics of agriculture.

1.Cost of Production per kilogram of output

$$= \frac{\text{Total cost per hectare} - \text{Value of by product per hectare}}{\text{Quantity of output produced in kilogram per hectare}}$$

2.Cobb-Douglas production function was fitted to identify the resource use efficiency of inputs during cultivation. The ordinary least square method was used for estimating the parameters associated with different independent variables.

The form of the function was linear and formally expressed as,

$$\mathbf{Y = Ax_1^{b1} x_2^{b2} x_3^{b3} x_4^{b4} d^{b5} U}$$

Where

Y= income obtained from paddy crop (in rupees / hectare)

A = Constant

X_1 = Cost of manures and fertilizers (in rupees / ha)

X_2 = Cost of plant protection chemicals (in rupees / ha)

X_3 = human labor charged (in rupees / hec)

X_4 = cost of seeds (in rupees / ha)

D = dummy variable D =1- if crop is irrigated

0-otherwise

U= error term

Since paddy was the major crop produced in both the regions, Cobb-Douglas production function was worked out for paddy for both the regions.

3.To identify the constraints influenced in crop activities Garett's ranking technique was used.

Per cent Position = 100 (Rij – 0.5)/Nj

Where,

Rij = Rank given for i^{th} factor by j^{th} individual

Nj = Number of factors ranked by j^{th} individual

RESULTS AND DISCUSSION

The study revealed that, the average land per household consists of 1.46 hec in region I and 2.48 hectares in region II .The results in Table 1. Showed that the average size was higher in Region II than in region I and the area under garden land was higher in region II than in region I. This was due to the fact that farmers who were away from coastal area had tapped ground water for irrigation purposes. In the above-mentioned areas, the variety of crops cultivated was paddy, cotton, chillies, groundnut, Gingelly, and coconut. Paddy is the one, which is considered as a major crop and next to which is chillies. Coconut cultivation is practiced in region II area.

The income obtained in Region I and region II varies accordingly.

Table 2. Shows that the total farm income was high in region II was due to the fact that most of the family receives foreign income other than crop activities. In region II, income earned from crop activities was high because of coconut cultivation. In order to identify the expenditure behavior of farm households during crop cultivation, cost and returns were worked out for three important major crops grown, such as paddy, chillies, and coconut.

The cost and returns of paddy from Table. 3 below shows that the, gross income and net income realized per ha of paddy was Rs.14, 228.50 and Rs.1, 385.49 in region I and Rs.19, 326.00 and 2100.69 ha in region

II.Above results indicated that the paddy production in region II was more profitable than in region I. This was mainly due to availability of groundwater and use of higher quantity of manures and fertilizers. And in region I, soil salinity is the major problem which affected the yield.

Cost and returns from chillies was also worked out and the results shows that the net income obtained are Rs.8, 323.48 and 9,419 where the higher net income is found in region II than region I. The reason may be due to variation in soil fertility and water availability.

It could be observed from the Table 3. that the gross income from chillies in region I was Rs.14, 450 and the net income was Rs.5, 762.08 / ha in region I, whereas in region Ii Rs.13, 750 and net income Rs.6, 944.49.The results revealed that net income in region I was lower than in region II.

Resource use efficiency

As only paddy crop occupies majority of the area and considered as a major crop, fitting Cobb-douglas production function for each region separately assessed the resource use efficiency in paddy cultivation.

Table 4. Below shows that the co-efficient of multiple determination (R2) of the function was 0.593, which indicated that 59.30 percent of variation in income of paddy was explained by five independent variables included in the model. Manures and Fertilizers (x1) were found to be significant at 1 per cent level while human labour wages and cost of seeds were found to be significant at 5 percent level. Irrigation used as a dummy variable was found to be non-significant.

The elasticity co-efficient for the cost of manures and fertilizers (x1) indicated by increasing the expenditures on manures and fertilizers by one per cent, there would be an increase in income of paddy by 0.455 per cent cetarious paribus. The co-efficient for cost of human labour and cost of seeds showed that one per cent increase in expenditure on human labour and seed from its mean level would increase the income of paddy by 0.02832 and 0.3488 per cent respectively indicating the scope for increased use of labour and seed cetarius paribus and Marginal value products of the significant variables were also estimated and furnished in Table 5.

Table 6. Shows that the result of marginal value product to the factor cost were 7.45,0.073,1.47 for cost of manures and fertilizers (x1), cost of human labour (x3), and cost of seeds (x4) respectively. These results indicated the manures and fertilizers would augment the income by 7.45 times the factor cost. While every rupee spent on wage for human labour and seeds would yield additional income of Rs 1.47, respectively. The marginal value productivity analysis indicated the scope to increase the income by resource allocation particularly in use of manures and fertilizers and seed material.

Region II

The co-efficient indicated that the increase in the expenditure on manures and fertilizers by one per cent would cetaribus paribus results in 1.81 per cent increase in income from its mean level, one per cent increase in cost of seeds from its mean level would cetarius paribus increase the income by 0.0488 per cent.

But the human labour cost was found to be negatively significantly at 5 per cent level indicating more use of labour. Dummy variable used to represent irrigation was statistically non –significant. This indicates that irrigation didn't have much influence on paddy income in the sample farms.

Marginal value products of the significant variables were estimated and the result shows that the ration of the marginal value products to the factor cost were 3.40, -8.13,1.93 for cost of manures and fertilizers (x1), human labour cost (x3) and the cost seeds (x4) respectively. It also revealed that for every rupee spent on manures and fertilizers would increase the income by Rs 3.40.Negative significant effect of human labour cost indicates that more cost was spent to increase the income. Amount spent on seeds would augment the income by Rs1.61 times the factor cost. The MVP analyses indicated the scope to increase the income by resource allocation particularly in use of manures and fertilizers and seeds.

Using more of seeds, fertilizers and manures could increase the production function analysis showed that in both the regions income from paddy crop. In region II, the labour use has to be reduced to increase the crop income. The final report of the survey showed that the farmers in the coastal area expressed that salinity was the major constraint followed by scanty rainfall and low net income.

To assess the problems faced by the farmers, Garett's ranking technique was used.

Region I

It could be seen from the Table 8. that in region I, scarcity of rainfall was the most important constraint was ranked first. Next to that was the soil salinity.

Lower product returns ranked third. The other constrains in the order were higher incidence of pest and diseases, inadequate availability of human labour and high wage rate, high cost of cultivation, high cost of seeds, organic and inorganic manures and plant protection chemicals

Region II

In region II soil salinity was the major problem identified and the lower product returns was ranked second. The constrains in the order of their importance were high cost of cultivation, scarcity of rainfall, inadequate availability of human labour and high wage rate, higher incidence of pest and diseases and high cost of seeds, organic and inorganic manures and plant protection chemicals.

The major problems identified in region I was scarcity of rainfall followed by soil salinity and in region II, soil salinity was the major problem identified followed by lower product returns.

CONCLUSION

The study revealed that dry lands was more in Region I(77.89 per cent)than region II (31.27 per cent) and the farmers from coastal area had tapped ground water fro irrigation purpose.Net income from paddy cultivation is lower in region I(Rs.1,385) area than region II(1,100.69).This fact was due to the fact of scanty rainfall in region I where the cultivation is only under rainfed.whereas in region II some parts of the area were irrigated

The results of the Cobb-Douglas production function were fitted to find out the relationship between the yield of paddy and the independent variables. Marginal value products of the significant variables showed that in both the regions income from crop could be increased by using more of seeds, fertilizers an manures and labour in region Ian din region II labour use has to be reduced to increase the crop income. Now-a-days most of the cultivable lands are kept fallow due to scarcity of inputs and scanty rainfall and majority of the population were living under poverty condition. Majority of the farmers raised crops under rainfed condition, which resulted in economic loss and financial risks to farmers, and hence dry land technique should be popularized in addition to cultivation practices, to use the resources at optimum level.

To overcome instability in the income of the farmers, appropriate farming systems needs to be developed. Moreover a large area in the coastal districts suffers from problems such as salinity and water scarcity. Due to these problems, crop yields were affected considerably. Farmers must be trained on reclamation of problem soils and growing suitable crops and varieties.

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Corresponding author:

Nandhini S. U., Alagumani T., Shibi S.
Department of Agricultural Economics
Tamil Nadu Agricultural University
Coimbatore –641 003
India

Tab. 1.: Land particulars of sample farms

S. No	Classification of land	Region I	Region II
1.	Wet land	0.10 (6.85)	0.62 (25.01)
2.	Garden land	0.22 (15.07)	1.08 (43.54)
3.	Dry land	1.10 (78.08)	0.78 (31.45)
	Total	1.46 (100.00)	2.48 (100.00)

(Figures in the parenthesis are percentages to total)

Tab. 2.: Average farm income of sample households

(in rupees)

S. No	Crops &livestock	Region I	Region II
1.	Paddy	14,228.50	19,326.00
2.	Chillies	14,450.00	13,750.00
3.	Coconut	-	38,902.50
4.	Gingelly	4,537.50	3,862.27
5.	Groundnut	-	4000.00
6.	Cotton	6,338.54	-
7.	Livestock	3,404.49	4,528.33

Tab. 3.: Cost and Returns of paddy

S. No	Particulars	Region I (<5km)	Region II (>5km)
1.	Variable cost	8969.01 (69.84)	12273.89 (71.25)
2.	Fixed cost	3874.0 (30.16)	4951.42 (28.75)
3.	Total cost	12,843.01 (100.00)	17,225.31 (100.00)
4.	Productivity in tonnes / ha	2.59	3.22
5.	Gross income	14,228.50	19,326.00
6.	Net income	1385.49	2100.69
7.	Gross margin	5259.49	7052.11

(Figures in the parenthesis are percentages to total)

Tab. 4. : Resource use efficiency of paddy in Region I

S. No	Variable	Notation	Regression Co-efficient	Standard error	T value
1.	Income of paddy (in Rs)	Y	-	-	-
2.	Intercept	A	2.350	0.218	10.759
3.	Cost of manures and fertilizers (in Rs)	X1	0.455**	0.062	7.293
4.	Cost of plant protection (in Rs)	X2	0.0556NS	0.035	1.568
5.	Cost of human labour (in Rs)	X3	0.02832	0.012	2.304
6.	Cost of seeds (in Rs)	X4	0.03488*	0.017	2.027
7.	Dummy variable	X5	-0.05210NS	0.009	-0.570

**-Significant at 1 percent level *- Significant at 5 percent level NS-Non significant

Tab. 5.: Marginal value products

S. No	Variable	MVP (in Rs)	FC (in Rs)	Ratio of MVP to FC
1.	Cost of manures and fertilizers	40.63	5.45	7.45
2.	Cost of human labour	5.69	75	0.073
3.	Cost of seeds	8.87	6	1.47

MVP-Marginal Value product FC -Factor Cost

Tab. 6.: Resource use efficiency of paddy in Region II

S. No	Variable	Notation	Regression co-efficient	Standard error	T value
1.	Income of paddy (in Rs)	Y	-	-	-
2.	Intercept	A	0.0937	0.401	0.248
3.	Cost of manures and fertilizers (in Rs)	X1	1.181**	0.126	9.394
4.	Cost of plant protection (in Rs)	X2	0.09319NS	0.046	2.022
5.	Cost of human labour (in Rs)	X3	-0.106*	0.024	4.445
6.	Cost of seeds (in Rs)	X4	0.0488*	0.023	2.168
7.	Dummy variable	X5	-0.00568NS	0.013	0.444

**-Significant at 1 percent level Adjusted R2 = 0.712 *- Significant at 5 percent level

NS-Non significant

Tab. 7.: Marginal value products in region II

S. No	Variable	Marginal value product (in Rs)	Factor cost (in Rs)	Ratio of MVP to Fc
1.	Cost of manures and fertilizers	18.58	5.45	3.40
2.	Cost of human labour	-0.61	75	-8.13
3.	Cost of seeds	9.67	6	1.61

Tab. 8.: Major Constraints Faced by the Farmers

S. No	Major constraints	Region I		Region II	
		Percentage	Rank	Percentage	Rank
1.	Soil salinity	50.75	II	86.80	I
2.	Scarcity of rainfall	75.95	I	60.00	IV
3.	Inadequate availability of human labour and high wage rate	46.66	V	55.90	V
4.	Higher incidence of pest and diseases	49.40	IV	48.13	VI
5.	High cost of seeds, organic and inorganic manures & plant protection chemicals	30.40	VII	36.25	VII
6.	High cost of cultivation	37.00	VI	65.01	III
7.	Lower product returns	53.95	III	72.50	II