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RESEARCH PAPER

Economics of cultivation of paddy under soil salinity in Tiruchirappalli district of Cauvery delta zone of Tamil Nadu

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ABSTRACT

A study on economics and major constraints in paddy cultivation in Tiruchirappalli district was conducted during 2011-12. The study covered two villages of Musiri block and data on constraints and cost-return aspects of paddy cultivation were collected from 80 farmers. The present study was conducted to assess the economic impact of soil salinity on paddy production. The crop yields in degraded soils were significantly lower over normal soils. The reduction in yield of paddy over normal soils was very high due to degradation and thereby resulting in negative returns. The operating cost of cultivation of one hectare of paddy worked out to Rs. 48228.00 and Rs. 46282.88 in affected and non-affected firms. The cost of reclamation of affected firm accounted for Rs. 3353.33 of total cost. The total cost of cultivation for one hectare of paddy was worked out to Rs. 62831.95 and Rs. 67670.90, respectively in affected and non-affected farms. The yield varied considerably and it was 3964.50 kg and 4590.88 kg per hectare, respectively in these firms. Labour shortage and pests and disease incidence were the major constraints faced by the farmers in paddy production.

KEY WORDS : Paddy, Salinity, Costs, Returns, Constraints

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Land degradation due to salinity is a major risk factor for long term food security (Bouis and Hunt, 1999). About 86 million hectares of irrigated land at the global level was affected due to salinity induced soil degradation. Grain output declined about 1.1 million tonnes each year due to waterlogging and salinity in developed and developing countries together (Brown and Young, 1990).

About 150 million hectares of land area in India was affected by different forms of land degradation, which accounted for 45.60 per cent of the total geographical area (Samra and Sharma, 2002). The state of Tamil Nadu has a total geographical area of 129.98 lakh hectares, of which 23.30 lakh hectares accounting for 17.93 per cent suffer from some sort of degradation. Out of these 5.14 lakh hectares are affected by salinity, alkalinity and acidity. Among different agro-climatic zones of Tamil Nadu, area affected by salinity accounted for more than 17 per cent in Cauvery delta zone.

Rice is predominantly cultivated in the Tiruchirappalli district and it was found that increased soil salinity levels were associated with reduced rice stands and yield. Unlike other major field crops, rice is grown in fields under continuously water stagnant condition. Rice is moderately sensitive to salt in the field as almost all other crop species (Neumann, 1997). Rice yield is not adversely affected until water salinity exceeds 2.0 dSm^{-1} (Ayers and Westcot, 1985). Even after a long period of technological advancement, yield gap still exists in many of the crops including rice. More than 50 per cent of the potential farm yield in the country is not realized yet in the case of rice. The yield works out to 3022 kg

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per ha, while the potential farm yield is 5781 kg/hectare (Siddiq, 2000).

Productivity of important crops, *viz.*, cotton, paddy and sugarcane, declined as the level of soil degradation increased (Gajja *et al.,* 1994). At farm level, the negative effects have been reported as reduction in farm income, restricted choice of crops and land abandonment (Mani *et al.,* 2001). The relationship between crop yield and soil salinity has been quantified for many crops under typical growing conditions, which had revealed that salinity typically reduces crop yields (Quirk, 2004).

Keeping this in view, the present study was conducted with the objectives of analyzing the comparative economics of paddy production between salinity affected and normal soil production environments and to study the constrains faced by the farmers in paddy production in Tiruchirappalli district of Cauvery delta zone of Tamil Nadu.

METHODOLOGY

Sampling :

Cauvery delta zone of Tamil Nadu has been selected purposively for the study. For obtaining the necessary field data from the farmers, stratified multistage random sampling design was adopted so that the sample selected is representative of the entire salt affected area in Tiruchirappalli district of Cauvery delta zone of Tamil Nadu. Musiri taluk of Tiruchirappalli district was selected purposively for this study.

Stratified multi stage random sampling was adopted to select the sample farmers. At first stage, all the blocks were arranged in ascending order based on area under salinity in 2011-12. Among the blocks, Musiri block of Tiruchirappalli district was selected. Two revenue villages were selected at random. Using the same criterion, from each village, twenty farmers each for salinity affected and non-affected farm were randomly selected. Thus, a total of forty farmers were selected from each village. Thus in all, a total of 80 farmers were selected for this study.

The data were collected through pre-tested interview schedule. The data collected pertained to the year 2011-2012 and were subjected to statistical analysis. In this study, the cost of cultivation of paddy at salinity affected and non-affected farm were calculated using cost concepts. The cost concepts are the standardized methodology for the estimation of cost of cultivation.

Tools of analysis :

The cost concept approach used was of Commission for Agricultural Cost and Prices (CACP) *viz.*, (Cost A1, Cost A2, Cost B1 and Cost B2, Cost C1 and Cost C2) which is widely used in India for evaluating crop profitability. The different cost items that were included under each cost concepts are discussed below with their computational procedures.

Cost A1 includes all expenses in cash and kind incurred in the production process by the farmer. It includes cost attached labour, imputed value of owned bullock labour, hired machine labour, and imputed value of owned machine labour, seeds, manure and fertilizers, plant protection chemicals, interest on working capital, depreciation and land reveue.

All actual expenses in cash and kind incurred during production by the farmers.

Cost A2 = Cost A1 and rent paid for leased in land if any.

Cost B1 = Cost A2 + Interest on owned fixed capital.

Cost B2 = Cost B1 and imputed value of owned land.

Cost C1 = Cost B1 and imputed value of family labour.

Cost C2 = Cost B2 + imputed value of family labour.

Cost C3 = Cost C2 *1.10 (10 per cent of Cost C2 added to Cost C2).

In the present study, the cost A1 and Cost A2 were taken as Cost A. Similarly, interest on owned fixed capital was not included in this study. Hence, Cost B1 and B2 were taken as Cost B. Similarly, 10 per cent of Cost C2 was not added to Cost C2. Hence, Cost C1 was considered as Cost C. Thus, cost concepts used here were Cost A, B and C. The prevailing wage rates of hired labour at village level had been imputed for family labour value.

Gross return: (total production of main product in kg × market price per kg) + (total production of by product in kg × Market price per kg)

Net return:(Gross return – Cost of cultivation) per hectare

Garrett's ranking technique :

Problems faced by sample respondents in rice production were assessed using Garrett's ranking technique in the following manner. For this purpose nine problems were first identified as important considered by the majority of respondents. Each of 80 respondents selected were asked to rank the problems from rank 1 to 9. In the next stage, rank assigned to each problem by each individual was converted into per cent position using the following formula :

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

where, R ij stands for rank given for the ith factor (i= 1,2……n) by the j th individual (j = 1,2...n) Nj stands for number of factors ranked by jth individual. Once the per cent positions were found, scores were determined for each per cent position by referring Garrett's Table.

ANALYSIS AND DISCUSSION

The results obtained from the present investigation are presented below :

Cost of cultivation and return in paddy :

In this study, the cost of cultivation of paddy crop at salinity affected firm and non-affected firm was calculated using the cost concepts (Table 1). Hence, the operating cost of cultivation of

one hectare of paddy worked out to Rs. 48228.00 and Rs. 46282.88 in affected and non-affected firms. In the affected and non-affected firms, labour was found to be the major input accounting for 47.82 and 44.97 per cent of the total cost.

This was followed by cost of fertilizers, which accounted for 9.72 and 9.16 per cent respectively, in these farms. The cost of reclamation of affected firm accounted for 5.34 per cent of total cost. Cost of manuring formed

Table 1 : Economics of cultivation of Paddy under salinity affected and non affected farms **(per hectare)**

Particulars	Affected farm (Cost in Rs.)	Non affected farm (Cost in Rs.)
Labour		
Hired human labour	18050.00 (28.73)	19255.00 (28.45)
Hired machine labour	10081.40 (16.05)	8461.95 (12.50)
Imputed value of machine labour	1908.13 (3.04)	2717.78 (4.02)
Factor inputs		
– Seed	1523.03 (2.42)	1593.90 (2.36)
– Manure	2962.18 (4.71)	3307.85 (4.89)
– Fertilizers	6106.45 (9.72)	6195.65 (9.16)
– Pesticides	2100.73 (3.34)	2316.08 (3.42)
– Irrigation charges	2142.78 (3.41)	2434.68 (3.60)
– Reclamation measures	3353.33 (5.34)	0.00 (0.00)
Cost A1	48228.00 (76.76)	46282.88 (68.39)
Rent paid for leased in land	569.90 (0.91)	761.95 (1.13)
Cost A2	48797.90 (77.66)	47044.83 (69.52)
Imputed value of owned land	11629.28 (18.51)	18701.28 (27.64)
Cost B	60427.18 (96.17)	65746.10 (97.16)
Imputed value of family labour	2404.78 (3.83)	1924.80 (2.84)
Cost C	62831.95 (100.00)	67670.90 (100.00)

Note : Figures in parentheses indicate percentage total

Table 2 : Returns structure in paddy under affected and non affected farms **(per hectare)**

Returns	Affected farm (in Rs.)	Non affected farm (in Rs.)
Yield of paddy(kg)	3964.50	4590.88
Gross return (Rs.)	67620.15	79024.23
Net return (Rs.)	4788.20	11353.33

Table 3 : Constraints in rice production (multiple responses)

Constraints	Per cent of farmers responded	Rank
Soil related problems		
– Salt affected soils	50	III
– Lack of technical know –how about reclamation	45	IV
– Poor organic matter status	32	VI
Socio-economic		
– Small size of the farm	28	VII
– Labour shortage	75	I
– Electricity problem	24	VIII
Technical		
– Late transplanting	35	V
– Pest and disease incidence	60	II
– Imbalanced use of fertilizers	22	IX

4.71 and 4.89 per cent, respectively, which was followed by irrigation charges, pesticides and seeds.

The cost of imputed value of family labour was 3.83 and 2.84 per cent, respectively in affected and non affected firms. Cost A2 was higher in affected firm than non affected firm in these farms. The same trend was observed for Cost B and Cost C also.

The total cost of cultivation for one hectare of paddy was worked out to Rs. 62831.95 and Rs. 67670.90, respectively in affected and non-affected farms.

The yield varied considerably and it was 3964.50 kg and 4590.88 kg per hectare, respectively in these firms (Table 2). This largely influenced the returns in paddy cultivation; the gross return was Rs. 67620.15 and Rs. 79024.23, respectively in affected and non-affected farm. The net return was as low as Rs. 4788.20 per hectare in affected farms, but as high as Rs. 11353.33 per hectare in non-affected farms (Table 2).

Constraints in rice production :

Major constraints faced by the famers in paddy production are presented in Table 3. The constraints were broadly classified into soil related problems, technical and socio-economic problems. Major constraints in rice production in the study area was labour shortage which accounted for 75 per cent, which was followed by pests and disease incidence (60 %), salt affected soil (50 %) and lack of technical know-how (45%). Addressing the problem of soil salinity and management of pests and diseases will help in enhancing the yield levels. This will result in increased income of the farmers in the study area.

Conclusion :

It is concluded that machine labour and human labour constituted major costs in the total variable costs. Pests and disease incidence and labour shortage were the major constraints faced by the farmers in the study area. Management of pests and diseases and addressing the problem of soil salinity will help in enhancing the yield levels in the study area.

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