

**TRADITIONAL AND SRI METHODS OF PADDY
CULTIVATION, COMPARATIVE ECONOMIC
ANALYSIS OF TIRUVARUR DISTRICT**

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INTRODUCTION

Rice is the staple food for about 50 per cent of the world's population that resides in Asia, where 90 per cent of the world's rice is grown and consumed. In Asia, India has the largest area under rice (41.66 million ha) accounting for 29.4 per cent of the global rice area. Of the total harvested area, about 46 per cent is irrigated with 28 per cent rain fed lowland, 12 per cent rain fed upland and 14 per cent flood prone. Rice is one of the largest traded commodities in the world with a total quantity traded touching 16.4 million tonnes. The south east countries account for about 40 per cent of the rice trade in the world.

NEED FOR THE STUDY

Around 30 percent of the population of Tiruvarur is below the poverty line. Agriculture, being the mainstay of the economy, provides a livelihood for 80 percent of the population and accounts for 36 percent of GDP. Rice is the most important cereal crop. But there has always been fluctuation in its production due to dependency on monsoon rainfall, added that Tiruvarur has not reached its irrigation potential. Despite being the main crop of Tiruvarur, rice cultivation is becoming less profitable due to increasing price of inputs and decreasing returns. SRI is feasible in terms of its less water requirement. SRI does not require farmers to shift towards the high yielding variety of genetically modified rice. It's only the change in cultivation method which enables them to harvest more than double thereby increasing their socio-economic wellbeing. SRI method of paddy cultivation is profitable when compared to traditional method, the techniques of production followed in SRI method contributes to the productivity differences of traditional method. Farmers adopting SRI method are technically efficient it is even claimed that no part of Tiruvarur need to be short of food anymore if SRI is promoted nationally. SRI studies done so far by many researchers and scientists are limited to experimental and demonstration activities. Almost no studies have been carried out on the comparative study of Traditional and SRI method of paddy cultivation.

SPECIFIC OBJECTIVES OF THE STUDY

- To compare and contrast the cost and returns of paddy cultivation in traditional and SRI methods.
- To decompose the contribution of resources to the productivity differences between traditional and SRI method of paddy cultivation.
- To study the technical and allocative efficiency in paddy cultivation under traditional and SRI methods.
- To suggest appropriate policies for improving resource productivity in paddy cultivation.

HYPOTHESES

- SRI method of paddy cultivation is profitable when compared to traditional method.
- The techniques of production followed in SRI method contributes to the productivity differences.
- Farmers adopting SRI method are technically efficient

LIMITATIONS

- The study is limited to Tiruvarur only. So conclusions drawn from there cannot have universal acceptance.
- The study is limited to the Needamangalam and Mannarkudi block area alone.
- Income and expenditure calculation were based on the information given by the respondents who are apprehensive and biased a certain extent.
- The respondents were unable to give separate details about their family income and their agricultural income.

REVIEW OF LITERATURE

In this first part review the past literature pertaining to the present study by considering the growing importance of SRI rice, the studies conducted on SRI rice both in India and other parts of the world were reviewed. The efficiency issue in agricultural production is an important aspect from the point of view of agricultural development in developing countries. The understanding of these issues would provide direction for the study. The major studies dealing with various issues with which the present study is concerned are discussed under the following heads.

- ❖ Economics of rice cultivation
- ❖ Technical and allocative efficiency in rice cultivation
- ❖ Factors contributing to yield differences
- ❖ SRI method of rice cultivation.

RESEARCH GAP

The survey of existing literature reveals that there are many studies about paddy cultivation by using traditional and SRI methods separately. The researcher was interested in doing a comparative research in traditional and SRI method of paddy cultivation, economically and scientifically. The reason for choosing Tiruvarur districts is that, agriculture continues to be the most predominant sector of the District economy, as 90 percent of the population is engaged in Agriculture and allied activities for their livelihood.

DESCRIPTION OF THE STUDY AREA

The present study was undertaken in Tiruvarur district of Tamilnadu. SRI method of rice cultivation was widely practiced in this district. Therefore, the district was purposively selected for the present study. This district come under cavery delta region of Tamilnadu.

SAMPLING DESIGN

BLOCK WISE DATA

S.No	Blocks	Villages	Kilometers	Households	Population	Rank
1	Mannargudi	51	251.01	33753	131164	I
2	Needamangalam	49	267.72	28522	115373	II
3	Kottur	49	241.92	28432	107525	III
4	Kodavasal	49	175.36	24952	96965	IV
5	Nannilam	48	190.84	25653	100999	V
6	Valangaiman	48	191.18	22166	88891	VI
7	Koradachery	44	173.05	26746	103301	VII
8	Thiruvarur	34	141.93	24746	93395	VIII
9	Thiruthuraipoondi	32	179.38	24501	91278	IX
10	Muthupettai	29	218.63	21575	77591	X

Sources:- District Statistical hand book 2011 – 2012
Block Statistical hand book 2012

The study was based on the input-output data obtained from sample farmers in Tiruvarur districts. For selection of farmers in Mannarkudi and Needamangalam block, multi-stage sampling design was employed.

TWO MAJOR PADDY GROWING BLOCKS IN TIRUVARUR

S.No	Blocks	Number of Households	Agriculture Land Owner	Number of Sample Respondent 25 %
1	Mannargudi	33753	3920	196
2	Needamangalam	28522	3280	164
Total		62275	7200	360

In this procedure, at first stage, two major paddy growing blocks following both traditional and SRI method of rice cultivation were purposively selected.

	I Stage	II Stage	III Stage
Tiruvarur	Needamangalam	Koothanallur	Pothakudi
			Sekarai
			Thothacheri
		Serumangalam	Kattakudi
			Moovanallur
			Kavarapattu
	Mannarkudi	Paravakottai	Paravakottai I
			Vadaseri
			Andami
		Asesham	Kadumangalam
			Nalamsethi
			Thirupalakudi

From each block, two major densely populated and paddy growing panchayat unions following both the methods of rice cultivation were selected at second stage. Then at third stage, three major paddy growing villages following traditional and SRI methods of rice cultivation were selected from each UNION. In the final stage, thirty farmers were randomly selected from each village comprising fifteen farmers for SRI method and fifteen farmers for traditional method of rice cultivation. Thus, the total sample size was 360.

NATURE AND SOURCES OF DATA

For evaluating the specific objectives of the study, necessary primary data were obtained from the sample farmers through personal interview with the help of pre-tested and well structured schedule (Appendix I). The data so collected pertained to the kharif season of the agricultural year 2016-18. The data relating

to general information about the sample farmers, their assets position, cropping pattern, details on various inputs used in paddy cultivation like chemical fertilizers, plant protection chemicals, seed materials and labour and cultivation practices such as land preparation, transplanting, irrigation, inter cultivation and harvesting along with labour requirement were collected. The adoption levels of the recommended methods of SRI method of paddy cultivation, its advantages and the constraints for it were also elicited.

PERIOD OF THE STUDY

The present study is a cross section study, will be based on the data for the year 2016 to 2018.

ANALYTICAL TECHNIQUES EMPLOYED

For the purpose of achieving the objectives of the study, the data collected were subjected to the statistical analysis. For this purpose, tabular and production function analyses were employed.

1.17 CHAPTER SCHEME

The entire study has been divided into five chapters. First chapter deals with the introduction, need for the study, objectives, hypothesis, limitations and chapter schemes of the study.

Chapter II Review of Literature

Second chapter deals with the review of literature on earlier studies that are having relation to the objectives of the present study then methodology, tools and techniques, profile of the study area and terms and definitions.

Chapter III

The third chapter analyze the General characteristics, live stocks, and cropping Pattern of sample farmers in the selected study area.

Chapter IV Analysis and Interpretation

The fourth chapter deals with the main results of the study and are presented in this chapter under the following heads, Nursery cost in traditional and SRI methods of paddy cultivation, Costs and returns structure in traditional method and SRI method of Paddy production, Technical and allocative efficiency in traditional and SRI methods of paddy production, Structural break and nature of technological change between the traditional and SRI method of paddy production, Sources contributing to the yield differences between traditional and SRI methods of paddy production, Adoption levels and constraints in SRI method of paddy cultivation.

Chapter V Summary and Policy Implications

The last summaries the overall results, draws conclusions and outlines the policies emerging from the study.

MAJOR FINDINGS

General characteristics of sample farmers

- The average age of the farmers growing paddy in traditional method was around 30-40 years whereas the average age of the farmers growing SRI paddy was around 41- 50 years.
- Average family size of the traditional paddy farmers which was 7, consisting 4 male and 3 female members, respectively but in the case of SRI paddy farmers, the average family size was 6 with 4 male and 2 female members
- It is estimated that among the agriculturist in the study area 12.5 percent are Government are Private 21 percent, 31 percent self employment and 8 percent are any other,
- Educational qualification of traditional and SRI paddy formers half of the traditional paddy farmers were found to be illiterates, whereas none of the SRI paddy farmers were illiterate and majority of them were having secondary or higher education.

- The average land holding of traditional paddy farmers and SRI paddy farmers was 3.53 hectares and 5 hectares, respectively.
- The livestock composition of both traditional paddy farmers and SRI paddy farmers was higher number of buffaloes was in dominating position. SRI paddy farmers comparatively had more number of livestock than traditional farmers.
- The machinery status of farmers of both the methods was dominated by power sprayer. SRI paddy farmer's machinery status was higher than that of traditional paddy farmers
- SRI paddy farmers were growing more number of crops per season and per year than the traditional paddy farmers. Crops grown by traditional paddy farmers were paddy, cotton, black gram green gram groundnut and corn in during kharif and summer season

Nursery cost for traditional paddy and SRI paddy cultivation

- The SRI paddy cultivation needed 6 kgs of seed per acre for nursery management, the Traditional cultivation needed 80 to 90 kgs of seed per acre for nursery management.
- Organic and inorganic fertilizer use in traditional nursery management and SRI formers used mostly full and full FYM approximately 151 kg to 200 kg per acre in the study area.
- Plant protection chemical was used in 200 ml PPC in traditional method and only below 50 ml used in SRI method of paddy nursery management
- Wage rate and labour inputs it is observed that there is a table and 2-3 mandays of human labour and 2 mandays of human labour used by Traditional SRI paddy farmers.
- Nursery cost for traditional method (Rs. 1374) was considerably higher than that of the SRI method (Rs. 178), expenditure made on seed (Rs. 922) contributed substantially to the high nursery cost in traditional method.

- No expenditure was made on FYM in traditional nursery management and no expenditure was made on chemical fertilizer in SRI nursery management.
- The share of PPC was negligible in both the methods.

Costs and returns structure in traditional paddy and SRI paddy production

- Traditional paddy farmers have used 71 to 74 kg of seed and 65- to 70 kg of seed used in SRI formers.
- These macro-nutrients are nitrogen (N), phosphorus (P) and potassium (K) or NPK for short the traditional and SRI Farmers most of the farmers used in approximately 150 kg per hectare NPK.
- There are 75 percent of traditional formers using in PPC1500 ml in a hectare and SRI formers used only 200 ml in a hectare.
- Human labour using pattern in paddy cultivation, there are 89 percent traditional farmers using 140 to 180 man days and farmer using 170 SRI respondent using 170 to 200 man days in paddy cultivation
- Bullock labour used by paddy formers, per hectare use traditional farmers 5 to 7 pair bullock and 8 to 10 pair in SRI farmers in paddy production
- The quantities of seed, fertilizer and PPC use was more in traditional paddy cultivation whereas human labour, bullock labour, machine labour and FYM use was more in SRI paddy cultivation.
- Fixed costs like rental value of land and interest on fixed capital were found to be more for traditional paddy farmers.
- Depreciation cost was more for SRI paddy farmers. However, land revenue remained same for both the methods of paddy cultivation.
- The share of human labour in the total cost was more in both the methods.
- The least contributing item to the total cost was land revenue in both the methods.
- The share of variable cost in total cost was 84.46 per cent and 84.89 per cent in Traditional paddy and SRI paddy, respectively.

- The rental value of land was the major contributing expenditure to the fixed cost in both the methods.
- SRI method paddy farmers harvested higher yields (8.51 tonnes/ha) than the traditional method paddy farmers (6.07 tonnes/ha).
- Net returns over cost A, cost B and cost C in SRI method paddy cultivation were more than those of the traditional method paddy cultivation.
- The returns per rupee spent was around Rs. 2.02 for SRI method paddy and Rs. 1.56 for traditional method paddy.

Technical and allocative efficiency in traditional paddy and SRI paddy

- The coefficient of multiple determination (R^2) was 0.83 and 0.85 for estimated production functions of traditional paddy and SRI paddy, respectively.
- The constant returns to scale was noticed in both traditional paddy and SRI paddy production.
- Both traditional paddy production and SRI paddy production were positive and significantly conditioned by all variable inputs except land for which the positive relation was noticed in traditional paddy production (statistically not established) and negative relation in SRI paddy production (statistically not established).
- MVP-MFC ratio was more than one for inputs like seed, fertilizer and FYM but less than one for inputs like labour, expenditure on PPC and miscellaneous items and land in traditional paddy cultivation.
- MVP-MFC ratio was more than one for all the inputs except land for which it was negative in SRI method of paddy cultivation.
- The average technical efficiencies for traditional paddy and SRI paddy farmers was 0.798 and 0.734, respectively.
- Most of the farmers were found to operate between 0.71 to 0.75 technical efficiency rating in both the methods of paddy production.

- Traditional paddy farmers can save 25 per cent inputs and SRI paddy farmers can save 22 per cent inputs to produce the existing level of paddy output by enhancing efficiency.
- The allocative inefficiency level (47.4%) was more for traditional method of paddy cultivation than that of the SRI method of paddy cultivation (31.7%).
- SRI paddy farmers were found to operate at high economic efficiency level (50.00%) when compared to traditional paddy farmers (41.9%).

Structural break and nature of technical change

- There was a structural break in the paddy production with the introduction of SRI method.
- Technological change between traditional and SRI method of paddy production was because of the shift in the intercept.

Source contributing to the yield differences

- The total productivity difference between the SRI method of paddy cultivation and traditional method of paddy cultivation was estimated to be 33.72 per cent.
- The difference in technology (31.61%) was found to be the major contributor to the yield differences between SRI paddy and traditional paddy.

CONCLUSIONS

All the sample farmers followed the wider spacing in SRI method of paddy cultivation. Complete adoption level was high in the case of nursery area (81.67%) followed by transplanting practice (75%), weed management (66.67%) and transplanting time (56.67%). Partial adoption level was high in the case of organic manure application (63.33%) followed by water management (58.33%) and seed rate (56.67%). From the research study we can come to a conclusion the use of SRI method of paddy cultivation is more profitable than the traditional method, The reasons being that, practicing SRI method by sample farmers were

less water requirement and higher yield levels, but of course the major constraints in practicing SRI method were high labour requirement and weed menace.

POLICY IMPLICATIONS

1. The paddy yields are high by about 30 per cent in SRI method when compared to the yields in traditional method of paddy cultivation. It was well supported by decomposition analysis. Therefore, the government and extension agencies need to popularize and encourage the widespread adoption of SRI cultivation. Government may even provide incentives by way of subsidies or in other forms to encourage widespread cultivation of SRI method.
2. The use of resources like seeds, fertilizers and FYM can be increased to optimize the resource use and get maximum returns in traditional method of paddy cultivation, whereas in SRI method of paddy cultivation, use of all the resources can be increased except land. So, there is a greater scope for reorganization of resources in both the methods of paddy cultivation as revealed by MVP-MFC ratios of the resources.
3. The technical inefficiency levels in both the methods of paddy production (26.6 % in SRI method and 20.2% in traditional method) indicated that there is a scope to enhance the productivity levels in both the methods without using additional resources. Therefore, there is a greater responsibility on the part of the extension department to provide timely suggestions and to conduct extension programmes regarding recommended practices of production in SRI paddy cultivation as well as in traditional paddy cultivation.
4. High labour requirement particularly for transplanting and weeding operations was the major constraint in practicing SRI method. The agricultural engineering department should fabricate different models of power operated mechanical weeders suitable to different soil conditions.

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