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RESEARCH PAPER

Socio-economic impact of system of rice intensification (SRI) and traditional rice cultivation in Villupuram district of Tamil Nadu : experiences from TN-IAMWARM Project

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Abstract : The study has assessed the socio-economic impact of rice intensification. The results of the study revealed that, variables namely age, education, farming experience, SRI experience, information seeking behaviour, training attended, extension orientation, economic motivation, risk orientation, market perception, innovativeness and attitude were found to be positively significant at 1 per cent level of probability with their extent of adoption of SRI technology. The most important constraint in SRI cultivation has been identified as usage of cono-weeder (58.21 %) followed by nursery management (56.61 %). The adoption of SRI technique has helped increase the rice production without increasing the area under its cultivation and has proved to serve as an alternative method for rice cultivation.

Key Words : Socio-economics, Attitude, Adoption, SRI technology

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INTRODUCTION

Rice accounts for significant contribution to the total food grain production in India. As the rice production area either stabilizes or declines there is a wide gap between projected demand and current levels of production (Vijayakumar *et al.*, 2005). But rice continues to hold the key component for sustainable food production in India.

In India, out of the total 604 districts, rice is grown in 560 districts, indicating its importance as a food crop. Tamil Nadu is considered as one of the leading rice producing and consuming states of India. It occupies 7 per cent of the nation's population, 4 per cent of the land area and 3 per cent of the water resources at all India level. The annual average rain fall at all India level is 1200 mm whereas the rainfall in Tamil Nadu is 930 mm. In this situation, the land and other natural resources are fully utilized in this State. The average land holding was 1.25 hectares during 1976-77 and it is 0.83 hectares which is lower than the all India average of 1.33 ha (Census report, 2011). Thus, 91 per cent farmers in Tamil Nadu are small and marginal farmers, of the total geographical area of 130 lakh hectares, around 51 lakh hectares are the net cultivated area. Wanjari *et al.* (2006). About 28.63 lakh hectares constituted the net irrigated area and the balance area of 22.37

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lakh hectares is rainfed. So it was felt necessary to adopt a low water consuming rice production technology to attain the targets of National food security mission. Bouman and Tuong (2001); Uphoff (2001 and 2002) and Stoop *et al.* (2002). Thus, World Bank during the mission in October, 2005 indicated that, the Irrigated modernization project with the prime view of water saving concept made evolved as "Tamil Nadu Irrigated Agriculture Modernisation and Water-bodies restoration and management (TN-IAMWARM)" is a project running from 2007 until 2015.

The project covers an area of 6.17 lakhs hectares spread over 61 sub - basins out of the 127 sub - basins in the state. The important interventions carried out in the sub-basins during April, 2009 to March, 2010 are, system of rice intensification (SRI), Precision Farming, Improved Production Technologies in garden land Pulses, Groundnut, Sunflower, Maize, Cotton and e-Velanmai (an ICT based Agriculture technique).

Since, the project has been implemented from 2007 onwards, in 61 sub-basins, Varaganadhi sub-basin in Villupuram district had SRI farming activities. SRI offers the opportunity to increase production and income substantially (Pandian *et al.*, 2011; Thiyagarajan *et al.*, 2000 and 2002). But still the sustainability and overall adoption rates are low. Understanding the constraints of adoption of SRI may result in (local) governments and development project trying to remove some of the constraints. Socio-economic impact, shown to be an important factor influencing farmer's decision to adopt a new technology, needs elaborate research. No important research has been done on the topic of socio-economics, attitude and the adoption of SRI before in this sub-basin; it is complimentary in the sense that it investigates an extra factor that may explain SRI adoption patterns. Hence, the specific objectives of this study are as follows :

- To study the profile and socio-economic conditions of the beneficiaries under TN-IAMWARM project,
- To study the attitude of farmers towards SRI system,
- To assess the use and extent of adoption of SRI system,
- To identify the constraints and formulate strategies for scaling up SRI system under TN-IAMWARM project in Villupuram district.

Literature review :

Rice is a major crop produced worldwide. Following Basu and Leeuwis, "rice is the second most widely grown cereal crop and staple food for more than half of the world's population" (Basu and Leeuwis, 2012). Although rice is consumed worldwide, the main production and consumption is located in a few countries only. To keep up with the worldwide population growth and income induced demand for food, it is estimated that the rice production in the aforementioned countries has to be increased by 56 per cent in 2050 (Anbarassan *et al.*, 2013).

Agricultural state like Tamil Nadu, there is need for intensifying efforts to improve productivity and income. This is in line with Anbarassan *et al.* (2013), who point out that "rice is the staple crop of South India. It is an important ingredient of household food-basket, yet the yield level has been low and uncertain. It is plagued by many socio-economic depredations as the operational holding-size is shrinking, and land and water resources are being degraded" (Anbarassan *et al.*, 2013).

The socio-economic and environmental depredations include factors like labour force availability, access to capital, education, access to timely availability of inputs, decreasing soil fertility, unequal distribution of information, water and land degradation and the effects of climate change (Noltze *et al.*, 2012).

MATERIAL AND METHODS

In the present study, the main aim is to analyse the socio-economic impact of SRI; for that Ex post facto research design was employed. The study was conducted in Villupuram district of Tamil Nadu. Villupuram district was purposely selected for the study because it is one of the leading rice producing districts of Tamil Nadu also it leading SRI paddy coverage for the period of 2011-12. Three blocks (Mailam, Vallam and Vikravandi) were purposely selected according to the highest area under SRI. From each blocks 40 farmers were selected (among them 20 farmers from SRI method and 20 farmers from conventional method) by following simple random sampling procedure, thus, making a total of 120 respondents. Extent of adoption of SRI technology by the respondents was studied by a well-structured and pre-tested schedule developed for the study. The data collected from the respondents were tabulated and analysed using suitable statistical methods. Correlation analysis was done to test the Null hypothesis to find out whether the dependent variables were significantly related or not.

RESULTS AND DISCUSSION

The general characters of the sample respondents are presented in the Fig 1. It is observed that the majority of the

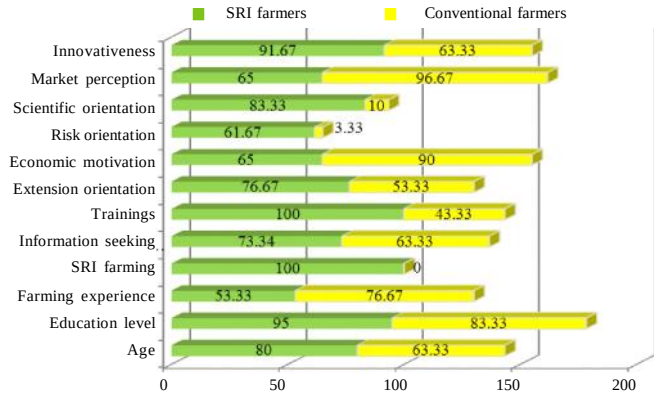

Fig. 1 : General characteristics of sample farmers

SRI farmers (80 %) belong to middle age category and majority of conventional farmers belong to old age category (63.33 %). More than 50 per cent of both the categories of farmers have attended High School.

Majority of the SRI farmers (53.33%) and conventional farmers (76.67%) had more than 25 years of farming experience. It is clear from the chart 100 per cent of the SRI farmers had more than one year experience in SRI farming. Majority of the respondents belong to medium category with respect to information seeking behaviour. It is observed that 100 per cent of SRI farmers had attended more than five trainings as compared to 43.33 per cent for conventional farmers. Higher percentage of the SRI respondents had medium level of economic motivation (65%) and also 90 per cent of the conventional farmers had medium level of economic motivation. So, SRI farmers main motive was to harvest good quality produce from their available land utilizing SRI techniques. SRI farmers are highly risk oriented (61.67). But only 3.33 per cent of the conventional farmers had high level of risk orientation. It is observed that SRI farmers were more scientifically oriented; 83.33 per cent of them had high level of scientific orientation as compare to 10 per cent of conventional farmers had high level of scientific orientation. 96.67 per cent of conventional farmers had better market perception than SRI farmers (65%). SRI farmers, being practitioners of a new technique, might not be aware of the opportunities and the vast market and the prices the produce can fetch in the market. In case of conventional farmers, they are more content with the production and the price they get, and were not very highly market oriented. SRI farmers had 91.67 per cent as compared to 63.33 per cent for conventional farmers in innovativeness. Most of the SRI farmers were influenced by the success stories of other nearby farmers through exposure visits.

Relationship between the characteristics of the respondents with the extent of attitude and adoption :

The socio-economic and psychological characteristics of farmers played a vital role in determining their attitude and adoption of SRI practices. Correlation analysis was employed to assess the relationship of characteristics of respondents with their attitude and adoption of SRI practices. The correlation co-efficients were worked out and the significance was tested by comparing with the table values. The results are presented below.

Relationship between the characteristics of respondents and Attitude towards SRI Practices :

The success of any agricultural technology mostly depends upon the favorable attitude of the farmers. Hence, the relationship between the attitude and the characteristics of farmers was studied and the results are presented in the Table 1.

It could be observed from the table that nine variables namely, age, education, farming experience, extension orientation, economic orientation, risk orientation, scientific orientation, market perception and innovativeness showed a positive relationship with attitude towards SRI practices. But for conventional farmers, eight variables namely, age, information seeking behaviour, training attended, economic motivation, risk orientation, scientific orientation, market perception and innovativeness showed a positive relationship with the attitude towards SRI farming. Education had a significant and positive relationship with SRI farmers' attitude. Educated farmers had an opportunity to adopt SRI practices because of greater exposure and interaction within and outside the social system which would have aided to greater adoption of SRI practices. But for conventional farmers, education had a negative correlation showing that education level has nothing to do with adoption of SRI practices.

A significant and positive relationship existed between economic motivation and attitude for conventional farmers, but not significant for SRI farmers. Conventional farmers are more highly motivated economically as compared to fellow SRI farmers. Likewise, risk orientation had a highly significant

Table 1 : Correlation between independent variables and attitude

Sr. No.	Independent variables	SRI farmers n=60	Conventional farmers n=60
1.	Age	0.1536	0.1252
2.	Education	0.2947*	-0.2535
3.	Farming experience	0.2476	-0.1114
4.	Sri experience	-0.1635	0.00
5.	Information seeking behaviour	-0.3685	0.0372
6.	Training attended	-0.2361	0.0996
7.	Extension orientation	0.1476	-0.0164
8.	Economic motivation	0.2075	0.4776**
9.	Risk orientation	0.7231**	0.3301
10.	Scientific orientation	0.7102**	0.7359**
11.	Market perception	0.2942*	0.3496*
12.	Innovativeness	0.1976	0.5372**

* and ** indicate significance of values at P=0.05 and 0.01, respectively

relationship with the attitude of SRI farmers. Risk taking ability of the farmers was high because of the profits and advantages of SRI over conventional farming. It also had a positive relationship with the attitude of conventional farmers. Both the respondent types had a significant and positive relationship between scientific orientation and attitude towards SRI practices. The farmers were more scientifically oriented and were interested in trying out the new technique of farming. Market perception had a significant and positive relationship with the attitude. Market perception was capable of changing the attitude towards SRI practice due to the high demand for quality produce at lower prices through SRI practices. This might have changed the attitude of farmers.

A positive relationship existed between innovativeness and attitude towards SRI practices. Conventional farmers were not less in innovativeness. They had a significant relationship with their attitude. Farmers with more innovativeness would have been much interested to use all SRI practices relatively earlier than others. So, farmers would have always been ready to accept the technologies without any delay. This might have influenced the attitude towards SRI practices.

Relationship between the characteristics of respondents and adoption of SRI practices :

Relationship between the characteristics of respondents and adoption of SRI practices was worked out and is furnished in Table 2.

It is noted from the Table 2 that out of 12 variables studied, eleven variables namely age, education, farming experience, SRI experience, information seeking behaviour, training attended, extension orientation, economic motivation, risk orientation, market perception, innovativeness and attitude showed a positive relationship with adoption. But for conventional farmers, only four variables showed positive relationship with adoption namely age, education, Economic motivation and scientific orientation. Economic motivation showed a significant and positive relationship with the adoption and developed the farmers' ability to face any risks. SRI farmers had faith in farming practices, that it would increase their production and productivity thereby increasing their standard of living. So the farmers had started adopting SRI practices.

A significant and positive relationship was seen between market perception and adoption for SRI farmers. Knowledge about the market is also a pre-disposing factor for adoption. So, if a farmer has proper knowledge, he can evaluate the opportunities and the profitability of the new farming technique. The possibilities of earning more by reducing the cost of production and the ability to see beyond the domestic market made the farmers to take positive decisions and adopt SRI practices.

Attitude showed a significant and positive relationship with adoption. Favourable attitude among the respondents was due to the realization of 'seeing is believing' and 'learning by doing' in SRI practices. This was popularized by the agricultural officers and staff, demonstrations, exposure field visits and training; it boosted the morale of the farmers' attitude towards switching over from conventional and intensive agriculture to low input and higher output SRI practices. But for conventional farmers, there were not any variables which showed a significant relationship with adoption.

Constraints in adoption of SRI method of paddy cultivation in Villupuram district :

The farmers were asked to list the major constraints faced in SRI method of cultivation and they were asked to rank the problems in adopting SRI practices. The responses were analyzed using Garrett's ranking technique. The results are presented in Fig 2.

A perusal of Fig. 2 revealed that the constraint 'Usage of cono-weeder' was the biggest constraint (58.21) followed by nursery management (56.61). Also based on the maximum

Table 2 : Correlation between independent variables and adoption

Sr. No.	Independent variables	SRI farmers n=60	Conventional farmers n=60
1.	Age	0.1564	0.1327
2.	Education	0.1926	0.1431
3.	Farming experience	0.0164	-0.0989
4.	Sri experience	0.0892	0
5.	Information seeking behaviour	0.0622	-0.1199
6.	Training attended	0.0192	-0.1254
7.	Extension orientation	0.1966	-0.0271
8.	Economic motivation	0.2614*	0.1696
9.	Risk orientation	0.2484	-0.0054
10.	Scientific orientation	-0.0251	0.0023
11.	Market perception	0.2823*	-0.0367
12.	Innovativeness	0.1832	-0.0572

* and ** indicate significance of values at P=0.05 and 0.01, respectively

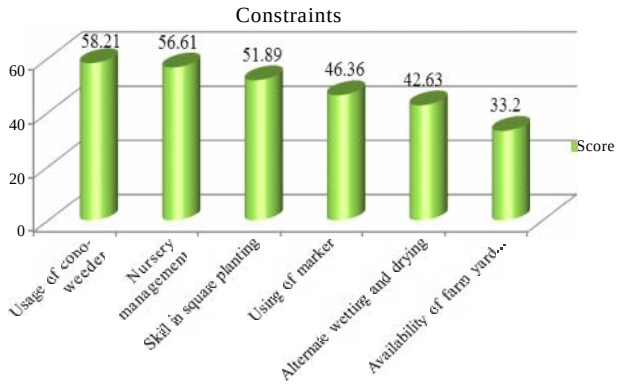

Fig. 2 : Constraints in adoption of SRI method of paddy cultivation in Villupuram district

score, it was concluded that the constraint skill in square planting (51.89) was the major constraint. Therefore, the most important constraint in SRI method of cultivation in Varagunadhi sub-basin in villupuram district of Tamil Nadu were difficulties in usage of cono-weeder followed by nursery management and skill in square planting.

Hypothesis testing :

To test the Null hypothesis, correlation analysis was done to check whether there is any significant relationship between the attitude of the respondents and adoption of SRI farming practices. The results are presented in Table 3.

Table 3 : Correlation between attitude and adoption of the respondents

Sr. No	Correlation between attitude and adoption of the respondents	
1.	SRI farmers	0.2778*
2.	Conventional farmers	0.1157

The results on correlation between attitude and adoption of the respondents clearly indicated that the SRI farmers, there is positive and significant relationship between the attitude and the adoption of SRI technics. Hence, the Null hypothesis is rejected, but for conventional farmers, there is a positive relationship between the dependent variables; however, they are not significant. So, the Null hypothesis is true - indicating that there is no significant relationship between the attitude of the respondents and the adoption of SRI technologies.

Conclusion :

Based on the findings of this study, certain implications have been drawn which might be useful for scaling up SRI practices in the study area and beyond. Economic motivation, scientific orientation and risk orientation were also found to be significant factors for adoption of new and improved technologies. Hence, the economic advantage of SRI as compared to conventional farming should be highlighted. The other major factors which had significant and positive relationship with adoption have been extension orientation and trainings undergone. Hence, it is essential that these interventions are also intensified to enable all the respondents to benefit from the practice. Information seeking behaviour, market perception and innovativeness also had a positive impact on the adoption. So, major sources of information like trainings, demonstrations and publications should be provided regularly. Information on market, prices and other aspects will also be helpful. Hence, interventions on these aspects need to be continued and strengthened to benefit all the farmers.

Among the constraints expressed by the SRI beneficiaries, usage of cono-weeder followed by nursery management and skill in square planting was found to be important. All these can be collectively addressed if the SRI beneficiaries are facilitated and motivated to get organised into registered societies and federated at block and district levels so that such organised and empowered groups would gain bargaining power while purchasing inputs from agro companies directly on one hand and strengthen the production, value addition, and marketing processes effectively to get maximum advantage and benefit. There should be proper linkages among the farmers, scientists and extension functionaries in order to enhance the adoption levels and it should be continued and further strengthened among all the stakeholders for sustaining the adoption for positive impacts. Success stories of successful farms and farmers can be motivating to other SRI beneficiaries and also general farming community. It needs to be regularly and continuously shared through publications, CDs, websites, newsletter and mass media. Awards may be thought of to recognise the achievers and contributors to promote the spirit of success.

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