Part -1 (Business, Economics & Statistics)
Chapter-IV
AUGUST/Vol.4.0/Issue-I

A study on Perception of System of Rice Intensification (SRI) Farmers in Erode district of Tamil Nadu

Abstract: The system of rice intensification uses lower external inputs, less water, and less seed than the traditional paddy production system. Reports indicate that SRI can increase farmers' current rice yield two-fold or three-fold. SRI is a relevant innovation, which increases production, reduces yield gap and ensures the household food security for the vulnerable section of small and marginal farmers. The study analysed the perception of SRI paddy farmers in Erode District. The results stated that lack of experience and lack of skilled labourers are the major factors for not adopting SRI method of paddy cultivation by the farmers in the study area. The study also revealed that the net income available is higher and the cost of cultivation of paddy is lesser to the SRI farmers than the traditional farmers.

ISSN CODE: 2456-1045 (Online)
(ICV-BES/Impact Value): 2.31
(GIF) Impact Factor: 1.272

Journal Code: ARJMD/BES/P-I/V-4.0/C-4/AUG-2016
Website: www.journalresearchijf.com
Received: 03.08.2016
Accepted: 11.08.2016
Date of Publication: 31.08.2016
Page: 18-26

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INTRODUCTION

Rice is an important ingredient of household food-basket and yet the yield level has been low and uncertain in India. The operational holding-size is shrinking and land and water resources are being degraded. Therefore, some innovative paddy production practice is needed to meet its growing demand due to population pressure. Under this scenario, the System of Rice Intensification (SRI) may be an appropriate practice to produce more food with fewer inputs. SRI is actually an amalgamation of refined and intensive management practices for paddy production at farmers' fields. The conservation of land, water and biodiversity and utilization of the hitherto ignored biological power of plant and solar energy are the novelties of SRI. On account of its growing global acceptance, SRI has emerged as a movement among farmers. More scientific research on varietal selection, effective realisation of genetic expression of the plant, wide spacing and ideal crop geometry, transplanting of tender seedlings, conjunctive use of water, akin to the concept of aerobic rice, zero tillage, weed management, pest and disease management, etc. have helped in accelerating the adoption of SRI.

The system of rice intensification uses lower external inputs, less water, and less seed than the traditional paddy production system. Reports indicate that SRI can increase farmers' current rice yield two-fold or three-fold. SRI is a relevant innovation, which increases production, reduces yield gap and ensures the household food security for the vulnerable section of small and marginal farmers. Many farmers have started to adopt this innovative method to increase the paddy yield in India in recent years. Against this background, this study is a modest to attempt to analyse the practices of paddy farmers using SRI method of cultivation in Erode District, Tamil Nadu.

REVIEW OF LITERATURE

Jyothirmai et al. (2003) studied the resource efficiency of paddy in Andhra Pradesh. It was found that at head region seed, labour and management index were found positive and significant and at middle region the coefficient of labour was positive and significant and at tail region coefficient of irrigation water was positive and significant.

It was also found that 56 to 61 per cent realisation of the maximum possible income by the farmers were from their given set of resources.

Rajendra (2005) studied the performance of System of Rice Intensification of Bansahan variety in Magan district, Nepal. The per hectare yield of SRI was 8.5 tonnes as against 4 tonnes of traditional method. He observed that SRI required less seed rate (5-10 kgs) and small quantities of water to achieve the mentioned yield level.

Rao and Rama (2011) assessed the economics and sustainability of SRI (System of Rice Intensification) and traditional method of paddy cultivation in North Coastal Zone of Andhra Pradesh for the period 2008–09 based on the data of costs and returns of crop. The study revealed that Benefit Cost Ratio is higher for SRI (1.76) than traditional (1.25) methods. Further, there was a 31 per cent yield gap between SRI and traditional methods, in which cultural practices (20.15%) showed a stronger effect than input use (10.85%). The most important constraint in SRI cultivation was identified as 'Nursery Management'. The SRI method being more skill oriented, the study observed that yields could be made sustainable if constraints are addressed on war-footing basis.

OBJECTIVES OF THE STUDY

- To identify the reasons for preferring SRI cultivation method.
- To evaluate the reasons why traditional paddy farmers are not adopting SRI method.
- To assess the cost of cultivation of paddy per acre in SRI method.
- To assess the cost and returns of paddy for SRI farmers.
- To compare the SRI farm practice with traditional paddy cultivation practice (per acre).
- To estimate the Cobb – Douglas production function for cultivation of paddy under SRI method.
- To examine the level of awareness of farmers on SRI features.

HYPOTHESES OF THE STUDY

- The independent input variables viz., paddy land, farm yard manure, seeds, chemical fertilisers, pesticides, weedicides and labour cost do not influence the production of paddy under SRI method.
- There is no significant impact of variables such as age, farm size, education, family size, farm experience, paddy land, extension contact, income from paddy and input cost on the decision of the sample paddy farmers to adopt SRI method.
- The socio-economic variables of the sample SRI paddy farmers like age, education, farm size, farm experience, family size, extension contact, paddy land, income from paddy and source of market information have no significant association with their level of awareness towards SRI features.

PERIOD OF THE STUDY

The study has been conducted during the year 2014.

METHODOLOGY - SAMPLING DESIGN

This study is an empirical research based on survey method. The present study is confined to Erode district of Tamil Nadu. Erode district, where the paddy farmers are following both traditional method and SRI method of paddy cultivation, has been purposively chosen for the study considering its huge contribution in paddy production in the state. In Erode district, there are 14 blocks. Out of 14 blocks in the district, five blocks namely Gobichettipalayam, T.N.Palayam, Modakurichi, Bhavani and Erode have been purposively selected for the present study as they contribute huge in terms of area of paddy cultivation and production of paddy during the year 2012-13. The sample size of the present study is 500 farmers. The farmers who cultivate paddy at least in one acre of land with 2 years of continuous experience in cultivation of paddy in the selected blocks have been considered for the study. From each selected block, 100 farmers have been selected purposively. Out of 100 paddy farmers considered from each block, 80 farmers who follow traditional method of paddy cultivation and 20 farmers who follow system of rice intensification method of paddy cultivation have been purposively selected. Hence, the total sample size of the study is 500 farmers consisting of 400 farmers following traditional method of paddy cultivation and 100 farmers following SRI method of paddy cultivation.

DATA

The study includes only primary data that have been collected well structured and non-disguised Interview Schedule.

TOOLS USED FOR DATA ANALYSIS

For analysing the primary data, the statistical tools such as Percentage analysis, Mean, Sum, Cobb-Douglas Production Function Model, Garrett Ranking Analysis, Analysis of Variance (ANOVA -'F' Test), Chi-square Test, 't' Test, Logistic Regression Model, have been used in this study.

ANALYSIS & INTERPRETATION

REASONS FOR PREFERRING SRI CULTIVATION METHOD: To identify the important reasons for preferring SRI method of paddy cultivation by the SRI paddy farmers, the Garrett Ranking Analysis has been used.

Table 1 - Reasons for Preferring SRI Cultivation Method: Garrett Ranking Analysis

Factors	Total Score	Mean Score	Rank
Less water requirement	6017.40	60.17	II
Higher production	6220.43	62.20	I
Quality and higher grains & straw yield	4680.33	46.80	VI
Lesser seeds	5116.96	51.17	IV
Less nursery cost	5142.81	51.43	III
Low nursery duration	5097.49	50.97	V
Low pest and disease attack	4049.45	40.49	VII
Less input cost	4002.41	40.02	VIII
Institutional support from Agri. depts. and NGOs	3226.79	32.27	IX
Positive results and experience voiced by the neighboring farmers	2237.92	22.38	X
Possibility of expanding the area under paddy cultivation with minimum water availability	1292.00	12.92	XI

Source: Field Survey

It is inferred from Table 1 that higher production with the mean score of 62.20 and less water requirement with the mean score of 60.17 are the primary factors influencing the adoption of SRI cultivation method as the production is more than the traditional cultivation method with minimum water requirement and cost of cultivation. Reasons such as less nursery cost, lesser seeds, low nursery duration, quality and higher grains & straw yield and low pest and disease attack are ranked third, fourth, fifth, sixth and seventh respectively. Less input cost, institutional support from Agri. depts. and NGOs, positive results and experience voiced by the neighbouring farmers and possibility of expanding the area under paddy cultivation with minimum water availability have only least influence in preferring SRI cultivation method.

REASONS FOR NOT ADOPTING SRI METHOD: SRI method efficiently uses scarce land, labour, capital and water resources, protects soil and ground water from chemical pollution, double the farmers' net income and is spreading fast as it is versatile. But still most of the farmers (who follow traditional method of paddy cultivation) are not ready to adopt this new method of paddy cultivation as they encounter some problems in implementing this method. To identify the important reasons for not adopting SRI method of paddy cultivation by the traditional paddy farmers (400 farmers), the Garrett Ranking Analysis has been used.

Table 2 - Reasons for Not Adopting SRI Cultivation Method: Garrett Ranking Analysis

Factors	Total Score	Mean Score	Rank
Lack of skilled labour	22486.98	56.22	II
Lack of awareness	19682.03	49.21	IV
Lack of training	21423.78	53.56	III
Lack of experience	22819.85	57.05	I
Lack of extension service	17917.76	44.79	VI
Do not want to take risk	19048.59	47.62	V
No need	16629.01	41.57	VII

Source: Field Survey

Table 2 depicts that lack of experience with the highest mean score of 57.05 is the first and foremost reason for not adopting SRI method as it is a new method of cultivation. Lack of skilled labour and lack of training are the next major factors influencing the non-adoption of SRI method with the mean scores of 56.22 and 53.56 respectively. The factors lack of awareness and do not want to take risk are ranked fourth and fifth with the mean scores of 49.21 and 47.62 respectively. The factors lack of extension service and no need have only least influence in the non-adoption of SRI method with lowest mean scores of 44.79 and 41.57 respectively.

COST OF CULTIVATION OF PADDY PER ACRE IN SRI METHOD: Cultivation expenses for each activity in SRI method of paddy cultivation have been collected from the SRI farmers and they are classified into three categories viz., input costs, labour costs and miscellaneous costs. Table 3 indicates the cost per acre incurred by the farmers of different size farms and average cost incurred by them per acre in SRI method of cultivation of paddy.

Table 3 gives a clear picture of the cost of cultivation of paddy per acre for marginal, small, medium and large farmers respectively. The cost of cultivation of paddy per acre incurred by a marginal farmer in case of SRI method is ` 21209.65, small farmer is ` 18255.41, by a medium farmer is ` 21838.79 and by a large farmer is ` 18809.41 respectively. The values indicate that the cost of cultivation per acre varies according to the size of land holding. Farm yard manure and harvesting expenses together contribute the major portion of the total cost incurred by the marginal, small, medium and large farmers. The aggregate of labour cost is the largest in the case of all types of farmers contributing more than 50% of the total cost incurred by each group of farmers.

Table 3 - Cost of Cultivation of Paddy per Acre in SRI Method (n = 100)

Cost Items	Marginal Farmers ‘	Small Farmers ‘	Medium Farmers ‘	Large Farmers ‘	Average ‘
Input costs					
Farm yard manure	3371.43 (15.90)	3250.00 (17.80)	3396.15 (15.55)	5047.06 (26.83)	3704.82 (18.02)
Seeds	377.36 (1.78)	152.47 (0.84)	181.79 (0.83)	194.71 (1.04)	236.49 (1.15)
Chemical Fertilisers	3235.71 (15.26)	2647.06 (14.50)	3357.81 (15.38)	2458.82 (13.07)	3030.32 (14.74)
Pesticides	478.21 (2.25)	358.82 (1.97)	664.06 (3.04)	394.12 (2.10)	504.68 (2.46)
Weedicides	452.17 (2.13)	247.06 (1.35)	354.69 (1.62)	200.00 (1.06)	329.78 (1.60)
Labour costs					
Land preparation	3032.14 (14.30)	2600.00 (14.24)	3350.00 (15.34)	1676.47 (8.91)	2849.00 (13.86)
Transplanting	2517.86 (11.87)	2361.18 (12.93)	2031.58 (9.30)	2594.12 (13.79)	2319.40 (11.28)
Applying Fertilisers	257.14 (1.21)	235.29 (1.29)	333.95 (1.53)	352.94 (1.88)	298.90 (1.45)
Applying pesticides & Weedicides	322.14 (1.52)	382.35 (2.09)	381.58 (1.75)	211.76 (1.13)	336.20 (1.64)
Weeding	1307.14 (6.16)	1106.47 (6.06)	1644.47 (7.53)	1258.82 (6.69)	1393.00 (6.78)
Harvesting	4333.93 (20.43)	3176.47 (17.40)	4603.95 (21.08)	2647.06 (14.07)	3953.00 (19.23)
Miscellaneous costs					
Pump Set maintenance	446.43 (2.10)	400.00 (2.19)	500.00 (2.29)	500.00 (2.66)	458.82 (2.23)
Scaring of birds and rodents	333.33 (1.57)	350.00 (1.92)	304.55 (1.39)	300.00 (1.59)	318.84 (1.55)
Other expenses	744.64 (3.51)	988.24 (5.41)	734.21 (3.36)	973.53 (5.18)	821.00 (3.99)
Total Cost	21209.65 (100.00)	18255.41 (100.00)	21838.79 (100.00)	18809.41 (100.00)	20554.25 (100.00)

Source: Field Survey; Figures in parentheses represent percentage to total cost.

Marginal farmers have incurred more cost for seeds and weedicides than that of small, medium and large farmers. Small farmers have incurred more cost for applying pesticides and weedicides and scaring of birds and rodents than that of marginal, medium and large farmers. Medium farmers have incurred more cost for chemical fertilisers, pesticides, land preparation, weeding, harvesting and pump set maintenance than that of marginal, small and large farmers. Large farmers have incurred more cost for chemical fertilisers, weedicides, farm yard manure, seeds, transplanting and applying fertilisers than that of marginal, small and medium farmers. The overall cost of cultivation of SRI farmers per acre is ` 20554.25. Farm yard manure and harvesting expenses together contribute the major portion of the total cost incurred by the SRI farmers. The aggregate of labour cost is the largest in the case of overall cultivation cost of paddy per acre in SRI method of paddy cultivation contributing more than 50% of the total cost incurred.

COST AND RETURNS OF PADDY FOR SRI FARMERS: Cost incurred by the SRI farmers in cultivating paddy plays a vital role in determining the net income available to them. Farmers sell their paddy output to the marketing source that suits their expectations at the prevailing selling price. Besides, the farmers sell the straw after harvesting at the prevailing rate. Table 4 shows the per acre details of gross income, cultivation cost and net income of SRI paddy farmers.

Table 4 - Cost and Returns of Paddy for SRI Farmers (per Acre)

Items	Marginal Farmers `	Small Farmers `	Medium Farmers `	Large Farmers `	Average `
Value of output of paddy – A	20145.00	23335.29	22973.05	24830.82	22558.60
Value of Straw– B	4857.14	3235.29	5144.74	3264.71	4420.00
Gross Income (A + B) = C	25002.14	26570.58	28117.79	28095.53	26978.60
Cost of cultivation –D	21209.65	18255.41	21838.79	18809.41	20554.25
Net income (C – D)	3792.49	8315.17	6279.00	9286.12	6424.35

Source: Field Survey

Table 4 conveys that medium farmers have earned more gross income (` 28117.79) than other category of farmers. The large farmers have earned higher net income (` 9286.12) than other category of farmers. The marginal farmers have earned less gross income (` 25002.14) and have incurred higher cost of cultivation (` 21838.79) than other category of farmers. The small farmers have incurred less cost of cultivation (` 18255.41) compared to other type of farmers. Only the marginal farmers have earned less net income (` 3792.49) in case of SRI method. On an average, the SRI paddy farmers have earned ` 26978.60 as their gross income per acre, incurred ` 20554.25 as their cost of cultivation per acre and received ` 6424.35 as their net income per acre.

SRI FARM PRACTICE VERSUS TRADITIONAL PADDY CULTIVATION PRACTICE – A COMPARISON (PER ACRE)

There may be a difference between the traditional method of paddy cultivation and SRI method of paddy cultivation in terms of inputs used and outputs derived. Generally, it is believed that SRI method reduces inputs used and cost of cultivation and increases the paddy output than the traditional method. Table 5 shows the comparison of SRI farm practice versus traditional paddy cultivation practice.

Table 5 - Comparison of SRI Farm Practice versus Traditional Paddy Cultivation Practice (per acre)

Particulars	Traditional Method	SRI Method
Seeds (in kgs)	25.18	7.06
Spacing (in cms)	18.50	22.51
Transplanting (in days)	26.02	16.50
No. of seedlings per hill	3.67	3.84
Fertilisers (in bags)	4.71	3.99
Pesticides (in litres)	1.17	0.97
Weedicides (in litres)	0.81	0.54
Weeding (in times)	2.22	2.42
Cultivation cost (in `) – A	22828.67	20554.25
Output (in podhi) –B	9.65	10.10
Selling price per podhi (in `) – C	2671.70	2767.60
Gross Income (in `)- D=(B X C)	25781.91	27952.76
Net Income (in `) E = (D –A)	2953.24	7398.51

Source: Field Survey; One podhi = 260 kilograms of paddy.

Table 5 clearly shows that only 7.06 kgs of seeds have been used per acre under SRI method as against 25.18 kgs under traditional method. SRI method spacing (22.51 cms) is higher compared to traditional method spacing (18.50 cms). In SRI method transplanting days (16.50 days) is lesser than the traditional method (26.02 days). Number of seedlings per hill is higher in case of SRI method (3.84) as against 3.67 in case of traditional method. Only 3.99 bags of fertilisers have been used in SRI method compared to 4.71 bags in case of traditional method. Only 0.97 litres of pesticides have been used in SRI method compared to 1.17 litres in traditional method. Only 0.54 litres of weedicides have been used in case of SRI method as against 0.81 litres in case of traditional method. Weeding has been done for 2.42 times in case of SRI method compared to 2.22 times in case of traditional method. The reason for this might be providing more space between the seedlings. It is also found that the cultivation cost per acre is also lesser in case of SRI method (`20554.25) compared to traditional method (`22828.67). The output of paddy per acre is higher in case of SRI (10.10 podhi) as against 9.65 podhi in case of traditional method. The net income derived out of SRI method is `7398.51 per acre as against `2953.24 in case of traditional method. The SRI farmers receive ` 4445.27 as an additional net income than traditional farmers due to decreased inputs, decreasing cultivation cost and increasing output of paddy per acre.

ESTIMATION OF COBB – DOUGLAS PRODUCTION FUNCTION FOR CULTIVATION OF PADDY UNDER SRI METHOD

Cobb-Douglas type of production function has been fitted in order to examine the influence of different inputs on output. Cobb-Douglas type of production function has been fitted with seven different inputs (x1 to x7) as independent variables and output of paddy per acre as the dependent variable. Table 6 shows the regression coefficients and related statistics of paddy production under SRI method of paddy cultivation.

Table 6 - Estimation of Cobb-Douglas Production Function for Cultivation of Paddy under SRI Method

Independent Variable	Parameter	Regression	Standard Error	't' Value
Intercept		0.194	1.473	0.132
Paddy Land	X_1	0.242	0.090	2.689**
Farm Yard Manure	X_2	-0.005	0.034	-0.150
Seeds	X_3	0.031	0.028	1.107
Chemical Fertilisers	X_4	-0.266	0.068	-3.930***
Pesticides	X_5	0.480	0.055	8.727***
Weedicides	X_6	0.208	0.096	2.167
Labour Cost	X_7	0.469	0.082	5.719***
F – value	11.873***			
R^2	0.546			
Return to Scale	1.16			

*Source: Field Survey; ***, ** and * indicate statistical significance at 1, 5 and 10 per cent respectively.*

Estimated values of the regression coefficient and related statistics of paddy production under SRI method are depicted in Table 6. Here, the inputs employed for producing the paddy mainly are paddy land, farm yard manure, seeds, chemical fertilisers, pesticides, weedicides and labour cost. These inputs are considered as the explanatory variables responsible for the paddy production.

Table 6 clearly indicates that the regression coefficients for farm yard manure (-0.005) is negative but not significant and chemical fertilisers (-0.266) is negative but significant at one per cent level of probability. The result thus indicates that the chemical fertilisers may not be a significantly contributing factor as compared to other factors. The regression coefficient of no single variable is significant at ten per cent level of probability but contribution of paddy land (2.689) is highly significant at five per cent level of probability. On the other hand, contribution of pesticides (8.727) and contribution of labour costs (5.719) under paddy cultivation are highly significant at one per cent level of probability. This means increase in yield level of paddy is directly proportional to increase in use of these inputs above the mean level. The elasticity of production of variable paddy land is 0.242 which means one percent increase in farm yard manure increased the yield of paddy by 0.242 per cent. Similarly one per cent increase in pesticides and labour costs have increased the paddy yield by 0.480 and 0.469 per cent respectively. The estimated regression coefficients for weedicides (0.208) and seeds (0.031) are positive but not significant. However, the farm yard manure is found to affect the production of paddy negatively, which means that this input is excessively used and therefore the production could be increased by decreasing the cost on farm yard manure.

The model used is best fit to the data as indicated by the highest and significant F-value (11.873) which means that all the included explanatory variables are important for explaining the variation in paddy production. The coefficient of multiple determination (R2) is 0.546 which indicates 54.6 per cent variation in paddy production has been explained by all the independent variables. The sum of elasticity of production (1.16) indicated that the scale of return is constant to the level of output.

ADOPTION BEHAVIOUR MODEL FOR SRI - LOGISTIC REGRESSION MODEL: Farmers' adoption of SRI has been studied using logit model. This study utilised a logistic regression model to empirically quantify the relative influence of various factors in the decision of the respondents to adopt SRI method or traditional method of paddy cultivation. This study has postulated that the probability of a farmer adopting SRI method (Li) depends on the attributes like age, farm size, education, family size, farm experience, paddy land, extension contact, income from paddy and input cost. The relationship of the dependent variable (farmer is adopting SRI method or not) can be examined with the independent variables. Thus, the logit regression model has been specified as Equation (1):

$$L_i = .(P_i / 1- P_i) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 \ldots\ldots + \beta_9 X_9 + e_i \ldots. (1)$$

Where,

L_i = Logit or log of odds ratio
P_i = Adoption of SRI method
$1- P_i$ = Adoption of traditional method
β_0 = Constant term
βi to β_9 = Coefficients to be estimated
e_i = error term
X_1 = Age of the farmer (years)
X_2 = Farm Size (acres)
X_3 = Education (years)
X_4 = Family Size (numbers)
X_5 = Farm Experience (years)
X_6 = Paddy Land (acres)
X_7 = Extension Contact (times per month)
X_8 = Paddy Income (`)
X_9 = Input Cost (`)

The parameters in equation (1) are estimated using SPSS 17 computer software.

MAXIMUM LIKELIHOOD ESTIMATES OF FACTORS THAT INFLUENCE ADOPTION OF SRI METHOD– LOGIT MODEL:
The logit framework discussed has postulated that the probability of a respondent to adopt SRI method (Li) is dependent on the socio-economic characteristics of the respondents such as age, farm size, education, family size, farm experience, paddy land, extension contact, income from paddy and input cost. The index variable Li is a dichotomous variable, i.e. it takes the value of one if a respondent is adopting SRI method (Li = 1) and takes the value zero otherwise (Li = 0). Li has been shown to be logarithm of odds ratio. The maximum likelihood estimate of the coefficients of the logit model for the respondents' adoption behaviour of SRI method is presented in Table 7.

Table 7 - Maximum Likelihood Estimates of Factors that Influence adoption of SRI Method– Logit Model

Variable	Parameter	Logistic Regression Coefficients (βi)	Standard Error	Significance	Exp(β)
Age	X_1	0.017	0.028	0.528	1.018
Farm Size	X_2	0.092*	0.058	0.080	1.052
Education	X_3	-0.007	0.029	0.811	0.993
Family Size	X_4	0.352**	0.026	0.029	1.386
Farm Experience	X_5	0.116**	0.020	0.046	1.164
Paddy Land	X_6	0.144	0.129	0.264	1.154
Extension Contact	X_7	0.417***	0.027	0.000	1.424
Paddy Income	X_8	0.327***	0.072	0.000	1.216
Input Cost	X_9	0.009	0.011	0.414	1.009
Constant		- 4.528***	1.437	0.002	0.011
χ^2	99.315				
-2 log likelihood	401.087				
Negelkeke R^2	0.685				

*Source: Field Survey; ***, ** and * indicate statistical significance at 1, 5 and 10 per cent respectively.*

It could be inferred from Table 7 that the results of the logistic regression model indicates that the fit of data is good as indicated by the statistical significance ($P < 0.01$) of the $\chi 2$ (chi-square). Negelkeke R2 tells that all the explanatory variables in the significantly fitted model could explain 68.5 per cent of variance in adoption of SRI method. The parameter estimates that five variables (farm size, family size, farm experience, extension contact and paddy income) have significantly influenced the choice of adoption of SRI method of paddy cultivation. From the results obtained, it is found that the coefficients of age, paddy land and input cost are minimal.

The results clearly indicated that farm size, family size, farm experience, extension contact and income from paddy are positive and highly significant whereas the education of the farmers is negative and not significant. It could be inferred that one unit change in the positive and significant coefficient would increase the probability of a respondent to adopt SRI method of paddy cultivation by the appropriate percentage. The results of this analysis would imply that the choice to adopt SRI would be influenced by the factors considered in this model. Further, out of nine variables subjected for analysis, the variable extension contact is found to be influencing the adoption decision on a high degree tending to increase the rate of adoption by 1.4 times for every contact with extension agency followed by the variables paddy income, family size, farm experience and farm size. Family size has influenced the rate of adoption by 1.3 times and a unit increase in paddy income and farm experience has tended to increase the adoption behaviour by 1.2 times and 1.1 times respectively. Farm size has influenced the rate of adoption by 1.05 times. The negative sign for the education indicated that respondents who are less educated are more likely to adopt SRI method.

OVERALL DISTRIBUTION OF SRI FARMERS BASED ON THEIR LEVEL OF AWARENESS ON SRI FEATURES

Table 8 gives the information of the overall distribution of the sample SRI paddy farmers by their level of awareness on SRI features.

Table 8 - Overall Distribution of Farmers based on their Level of Awareness on SRI Features

Awareness Level	No. of Respondents	Percentage
Highly aware	81	81
Less aware	19	19
Total	100	100

Source: Field Survey

Table 8 reveals that 81% of the sample paddy farmers are highly aware on SRI features whereas only 19% of the farmers are less aware in this aspect.

ASSOCIATION BETWEEN SOCIO-ECONOMIC VARIABLES AND AWARENESS LEVEL OF FARMERS ON SRI FEATURES: Table 9 presents the significance of association between the level of awareness of SRI sample paddy farmers and their socio-economic characteristics with the help of chi-square test and 'F' test.

Table 9 - Association between Socio-Economic Variables and Awareness Level of Farmers on Features of SRI Cultivation Method

Socio-economic factors	Chi-square value (χ^2)	'F' value
Age	2.028	4.823**
Education	5.263	6.332**
Paddy land	9.190**	2.551
Extension contact	12.524**	28.619**
Family size	2.814	4.478**
Source of information	29.149**	14.288**
Land tenure	12.725**	12.946**
Farm experience	1.766	2.500
Income from paddy	4.776	1.279
Total agricultural income	0.063	1.096

*Source: Field Survey; ** indicates significance at 5% level of probability.*

Table 9 shows the results of chi-square test and ANOVA ('F' test) regarding the association between socio-economic variables and level of awareness of farmers on features of SRI cultivation method. The results of chi-square test revealed that the variables such as paddy land, extension contact, source of information and land tenure have a significant association with the level of awareness of farmers on features of SRI cultivation method at 5% level of significance whereas the variables viz., age, education, family size, farm experience, income from paddy and total agricultural income are not significantly influencing the level of awareness of farmers.

The results of 'F' test revealed that the variables viz., age, education, extension contact, family size, source of information and land tenure have a significant association with the awareness level of farmers on features of SRI cultivation method at 5% level of significance whereas the variables like paddy land, farm experience, income from paddy and total agricultural income are not significantly influencing the level of awareness of farmers.

SUGGESTIONS: The following suggestions have been offered based on the findings of the study:

- The study shows that lack of experience and lack of skilled labourers are the major factors for not adopting SRI method of paddy cultivation by the farmers in the study area. In spite of efforts made by the extension agents, wide adoption is hard to achieve in the study area because farmers and labours lack the knowledge to implement certain SRI components. Hence, it is suggested that there is a need to train the farmers and labourers by providing them with more information about the advantages of each SRI component. To ensure fast and full adoption of SRI, more extension personnel, farmers and labours should be trained on the aspects such as production of healthy and robust seedlings through mat or conventional nursery, using the recommended spacing with the square method of transplanting young seedlings, using the conoweeder by having it available at a reasonable price and conducting demonstrations of its operation, and applying sound nitrogen management through the use of the leaf colour chart. These measures will make SRI more interesting and attractive thereby enhancing farmers' yield and income.

- The study reveals that the net income available is higher and the cost of cultivation of paddy is lesser to the SRI farmers than the traditional farmers. Hence, it is suggested that the farmers following traditional method of paddy cultivation in the study area may prefer SRI method so as to reduce their cost of cultivation and increase their net income. Further, they may use the services of the extension personnel and attend the training programs to become familiar in the SRI method of paddy cultivation.

- The study identifies that that the regression co-efficient for farm yard manure (-0.005) is negative in SRI paddy cultivation method. This means that this input is excessively used. Hence, it is suggested that the production could be increased by decreasing the farm yard manure in the SRI cultivation method. The farmers have to use this resource in an efficient manner in such a way that it leads to increase in productivity of paddy. Proper training given to the farmers in this regard would help them to utilise this resource in an efficient manner. Moreover, the farmers should be made aware of the crop management practices especially using farm yard manures at optimum level to increase the production of paddy under SRI method by way of reduced cost of cultivation. Further, the Government should tune up the extension agencies and research development for achieving this objective.

- The study discloses that, as per logistic regression model, the adoption behaviour of farmers preferring SRI method is highly determined by the factors like extension contact, paddy income, family size, farm experience and farm size. Hence, it is suggested that efforts are needed to strengthen these socio-economic factors for the adoption of SRI method of paddy cultivation in the study area. Support services through Government extension agencies for providing knowledge and information of SRI method of cultivation and its viability to increase the yield level should be given to the farmers in the study area in order to increase the ratio of adoption of SRI cultivation method.

CONCLUSION

Based on the findings of the study, quite a few valuable and fruitful suggestions have been offered to the farmers and the Government. If these suggestions are appropriately taken into consideration by them, paddy cultivation and marketing in the study area would be undoubtedly developed, the income and the standard of living of the farmers would be surely increased and our country's economic development as well as food security would also be eventually achieved.

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