SYSTEM OF RICE INTENSIFICATION VIS-À-VIS TRADITIONAL METHOD OF PADDY CULTIVATION IN CENTRAL ZONE OF KERALA UNDER FARMER PARTICIPATORY ACTION RESEARCH PROGRAMME(FPARP)

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ABSTRACT

Rice is the most water intensive food crop grown in lowlands under flooded conditions. Irrigated rice requires 5000 litres of water for producing 1 Kg of rice and water is becoming a scarce and costly input day by day. Several management strategies Viz., direct sowing, alternate wetting and drying etc., have been tried to alleviate the crisis but the yield potential could not be matched with that of irrigated transplanted rice. Therefore a more efficient and fundamental approach for reducing the water requirement is the need of the hour. In this context, System of Rice Intensification (SRI) was tried as an alternative practice to solve the water crisis and as a methodology for increasing the productivity of rice by changing the management of plant, soil, water and nutrients. SRI is amalgamation of refined and intensive management practices of rice production with advantages of production enhancement and cost reduction. The specificities of SRI are conservation of land, water and bio-diversity and utilization of biological power of plant and solar energy. Sustained yield levels among the community will ensure stable production and in turn food security, while economic sustainability would encourage the farmers to adopt the technology over time and space. Even though SRI was introduced in Kerala during 2004 the adoption of the technology was not in a rapid pace due to various constraints faced by the farmers owing to SRI requiring skilful management of resources. Keeping this in view Demonstrations were conducted in the farmers field under the Farmer Participatory Action Research Programme (FPARP) during the Kharif and Rabi 2012.Palakkad and Thrissur district of Kerala was selected for demonstration. Around 35 farmers were selected for the demonstration. The demonstrations were evaluated by comparing the plots of traditional practice followed by the farmers and the plots adopted by the farmers using the SRI principle Viz., Seedling age 12-15 days, Number of seedling per hill-Single seedling per hill, spacing of 25cmX25cm , use of cono weeder for weeding and less water application upto panicle formation. Training programmes were conducted before the start of Demonstration. Critical inputs line Markers and Cono Weeders were provided to the farmers.The crop was periodically monitored throughout the cropping period. Experiences from the farmssers were documented. Cost of cultivation for different components such as Nursery, main field preparation, planting, manures and fertilizers, irrigation, weeding, plant protection, Harvesting and Threshing was worked out for SRI and Traditional practices followed by the farmer. The cost benefit ratio worked out showed that SRI performed better than Traditional method of rice cultivation. Problem of requiring more attention, weed management, lack of skilled labour and water management was expressed as a constraint in the adoption of SRI in the farmers field. Overall SRI is perceived as very good in small holdings for increasing the rice production and productivity with less seed and less water. Hence it was concluded that SRI method of rice cultivation is the best choice for enhancing the productivity and profitability of rice.

INTRODUCTION

Globally, demand for rice is expected to increase by about 38 per cent by 2040.Rice is the most water intensive food crop grown in lowlands under flooded conditions. Irrigated rice requires 5000 litres of water for producing 1 Kg of rice and water is becoming a scarce and costly input day by day. Several management strategies Viz., direct sowing, alternate wetting and drying etc., have been tried to alleviate the crisis but the yield potential could not be matched with that of irrigated transplanted rice. Therefore a more efficient and fundamental approach for reducing the water requirement is the need of the hour. In this context, System of Rice Intensification (SRI) was tried as an alternative practice to solve the water crisis and as a methodology for increasing the productivity of rice by changing the management of plant, soil, water and nutrients. The SRI was conceptualized by Henri de Laulanie, a French missionary priest, in Madagascar during the early 1980s as a complimentary suite or rice (*Oryza sativa* L.) management techniques. The main components of SRI include careful transplanting of single young seedlings at wider spacing , water management that keeps the soil moist but not continuously flodded, early and frequent(3 to 4 times) mechanical /manual weeding before canopy closure, and ensuring adequate nutrient supplies(Laulanie 1993).SRI is amalgamation of refined and intensive management practices of rice production with advantages of production enhancement and cost reduction. The specificities of SRI are conservation of land, water and bio-diversity and utilization of biological power of plant and solar energy. Sustained yield levels among the community will ensure stable production and in turn food security, while economic sustainability would encourage the farmers to adopt the technology over time and space. SRI receives much attention from the farmers, researchers and policy makers. Initiatives of SRI were taken in India during 2003-04 .However SRI was introduced in Kerala during 2004 the adoption of the technology was not in a rapid pace due to various constraints faced by the farmers owing to SRI requiring skilful management of resources. With this background, present study was undertaken with the objectives To compare the costs and returns of paddy cultivation of paddy under SRI and traditional method of cultivation and to identify the constraint in adoption of System of rice Intensification.

MATERIAL AND METHODS

The study was conducted in the districts of Palakkad and Trichur districts in the Central zone of Kerala, during Rabi 2011-12. A brief description of selected districts is given below:

Table 1

Land use pattern of the Selected districts for 2006-07(Area in hectares)

Classification of area	Palakkad	Thrissur
Total Geographical area	44758422	302919
Forest	136257	103619
Land put to non agricultural use	47471	32820
Barren and uncultivable	3121	349
Permanent pastures and other grazing land	4	31
Land under misc tree crops	3151	454
Cultivable waste	23591	5482
Fallow other than current fallow	9283	5199
Current fallow	12455	16030
Marshy land	-	4
Still water	7346	6781
Water logged area	37	308

Social forestry	81	163
Net area sown	204787	131679
Area sown more than once	132452	50766
Total cropped area	337239	182445

Table 2

Rainfall, Soil and Water use pattern of the selected districts

Districts	**Rainfall (mm)**	**Soil**	**Water use pattern**
Palakkad	2472	Laterite and black	Canals:42754;Wells:16029 Tanks:4213;Other sources:13712 Minor irrigation:1155 Tube wells:1481;Total: 79344
Thrissur	3074	Sandy loam, Laterite,Clayey And Alluvial soil	Canals:23966;Wells:36384 Tanks:6605;Other sources:11029 Minor irrigation:3110 Tube wells:999;Total: 82292

In these two districts Agriculture is the main source of livelihood of the people and rice is grown in three distinct seasons Viz, Viruppu(Jun-Sep), Mundakan(Oct-Nov) and Puncha (Dec-March).Most of the cultivators are small farmers.Canal and well irrigations systems are fairly common. Demonstrations were conducted under the Farmer Participatory Action Research Programme (FPARP). The components of SRI adopted were careful transplanting of 12-14 days old young seedling at wider spacing(30X30 cm or 25X25 cm) on a square with only one seedling per hill, water management that keeps the soil moist but not continuously flood ie., alternate wetting and drying, frequent mechanical weeding through cono weeder(2-3 times) before canopy closure and dependence of high rates of organic compost for fertilizer. The farmers under the programme were selected through the Krishi Bhavans which is headed by the Agricultural Officer. After the selection of farmers were made they were given training on SRI aspects. The experienced farmers of Farmer Participatory Action Research Programme Phase I were involved in the training programmes thereby facilitating Farmer to Farmer Extension.The Critical inputs like Markers and Cono weeders were made available to the farmers for utilizing in their field. Periodical field visits were made to the farmers field. During the first season the farmers in Kerala could not adopt SRI due to excess rain. However demonstrations were conducted in the second season where in farmers will have a control in the water management.The area of demonstration ranged from 50 cents to one hectare. Each farmer participant was expected to conduct demonstration following the principles of SRI and the traditional practice which the farmer does usually. The same variety and time of planting was followed for both the SRI and traditional method of cultivation.Cluster approach of technology dissemination was followed in two villages viz., Thiruvilamala and Pattithara.The details of farmers selected are given below:

Table 3:Details of demonstration farmers selected for SRI

Districts	Name of village	Number of Demonstrating farmers
Palakkad	Pattithara	19
	Kizhakkenchery	9
	Ottapalam	4
Trichur	Thiruvilamala	1
	Kaniyarkode	19
	Total	52

The data regarding the demonstration was collected with a help of a structured interview schedule.

RESULTS AND DISCUSSION

Results on Cost of cultivation for SRI and Traditional method of cultivation was worked out for 8 different components Viz., Nursery preparation, Main field preparation, Planting, Manures/Fertilizers, Irrigation, Inter cultivation, Plant Protection and Harvest.

Table 4: Yield Performance of rice under Farmer Participatory Action Research Programme comparing the SRI practices and Traditional practices in Kerala

S.No	Name of village	Method of cultivation		Per cent yield increase
		SRI Yield (kg/ha)	Traditional Yield (kg/ha)	
1	Ottapalam	4049	3625	10.47
2	Thiruvilamala	4100	3900	4.87
3	Kaniyarkode	4590	4000	12.85
4	Pattithara	4066	3551	12.67
5	Kizhakkenchery	3425	3095	9.6
	Average	4146	3648	12.01

Out of the 5 villages selected for the study higher yield increase to the tune of 12 per cent was noticed in two villages viz., Kaniyarkode and Pattithara. This might be due to group activity. Anitha and Mani Chellappan (2011) reported that an yield increase of 20.50 per cent in SRI cultivation against traditional method of cultivation for the study conducted in humid tropics of Kerala.

Table 5:Comparative cost of cultivation in SRI and traditional method of Paddy cultivation in Central zone of Kerala

(Rs/ha)

S.No	Operation	Method of cultivation			
		System of rice intensification	Per cent	Traditional method	Per cent
1	Nursery preparation	761	1.94	2569	6.77
2	Main field preparation	6444	16.46	5876	15.49
3	Planting	5922	15.13	6522	17.19
4	Manures/fertilizers	7943	20.29	8050	21.21
5	Irrigation	657	1.68	343	0.90
6	Intercultivation	8912	22.76	5854	15.42
7	Plant Protection	1854	4.74	2025	5.34
8	Harvest	6655	17.0	6710	17.68
	Total	39148	100.00	37949	100.00

A comparison of costs and returns in SRI and Traditional method of paddy cultivation , given in Table 1, revealed that there was not much difference in the total cost of cultivation Comparison of cost and net income of SRI adoption over the traditional method of paddy cultivation revealed that the operational cost was Rs 39148/ha in case of SRI farmers which is Rs 1199 more than the traditional method of cultivation.Of which nursery preparation, planting and plant protection are significantly reduced in SRI farms , however , the cost of weeding is significantly more in SRI farms than Traditional farms mainly due to lack of awareness about the operation of cono weeder. The overall cost of cultivation is more in SRI as compared to traditional cultivation method due to use of more labour for land preparation, transplanting, weeding etc., Moreover it is commonly seen that first time adopters generally have high cost of cultivation which may be due to lack of precision in adoption of technology. Sain Mangal(2008) also reported higher cost of cultivation of SRI method compared to conventional method.

Table 6: Comparison of returns SRI Vs Traditional method

Parameter	**SRI**	**Traditional**
Grain yield(kg/ha)	4146	3648
Straw yield(Kg/ha)	5687	5094
Grain value(Rs/ha)	62190	54720
Straw value(Rs/ha)	14394	12252
Total cost of cultivation (Rs/ha)	39148	37949
Gross income(Rs/ha)	76584	66972
Net income(Rs/ha)	37436	29023
C:B ratio	1.95	1.76

The economic analysis revealed that although the cost of cultivation was more in SRI system of rice cultivation the parameters like gross income, net income and Benefit cost ratio recorded was higher. The mean gross income and net income under SRI was Rs 76584 and Rs. 37436 per ha respectively, while traditional method recorded only Rs 66972 and Rs 29023 per ha respectively. System of rice intensification registered a higher mean C:B ratio of 1.95 as compared to 1.76 under traditional method

of rice cultivation. Overall it is concluded that SRI technique is economically feasible for adoption to increase the productivity and net income of the farmers.

Table 7: Constraints faced by the farmers

S.No	Constraints faced by farmers	No. of farmers	% of farmers
1	Difficulty in following intermittent irrigation	28	53.80
2	Use of cono weeder difficult to adopt	44	84.61
3	Requires more attention than traditional cultivation	52	100
4	Difficulty in getting labour for timely field operation	24	46.15
5	Difficulty in adopting single seedling planting	29	55.76

Even after 6-7 years of introduction of SRI technology among farmers the pace of spread of technology is not rapid and farmers face several constraints in adoption of technology.It is evident from the table 4 cent per cent of the farmers have opined that the technology requires more attention than traditional method of cultivation.It is also seen that a vast majority of the farmers expressed that use of cono weeder is difficult to adopt. It might be due to reistance from labour as a result of drudgery and also since labour is a scarce commodity in the study area.

CONCLUSION

It is concluded from the study that SRI techniques is economically feasible as it increases the net income of the farmers. Further the adopters of the demonstration are first time adopters. Hence there is more chance of cost of cultivation getting reduced once the farmers get acquainted with this new practice of rice cultivation.There is considerable scope for improvement of SRI techniques by incorporating power operated cono weeder which saves the labour problem and the time taken for weeding is also minimized.Imparting skill training to the farmers and Extension personnel is the need of the hour .

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