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Comparative Study of System of Rice Intensification and Traditional Method of Rice Cultivation in Thiruvarur District of Tamil Nadu – India

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Abstract:*The economic analysis of System of Rice Intensification (SRI) vis-à-vis conventional method of rice cultivation was assessed in Thiruvarur district during 2010-15. Rice is commonly grown by transplanting one month-old seedlings into puddled and continuously flooded soil which leads to higher losses of water through puddling, surface evaporation and percolation. Excessive pumping of water for puddling causes problems of declining water table and poor quality water for irrigation. High water need, seed amount, labor costs and labor requirements for TPR have reduced profit margins. During the past years efforts have been tried to find out alternatives to the traditional method of rice cultivation. System of rice intensification a resource conservation method is found to be an efficient alternative to increase the rice production as it require less water, less seed, reducing cost of cultivation and saving labor over time.*

K e y w o r d s : *Economic benefits, Grain yield, SRI and Traditional method of Water use efficiency.*

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I. Introduction

Rice is the most important food crop of India. The area and production of rice is coming down in recent years due to lack of sufficient water in irrigation systems. SRI has the potential to meet the challenge by virtue of its capacity to double or even triple the productivity and less water requirement.

The Traditional paddy cultivation was oldest method of rice cultivation. The Traditional paddy cultivation practices also had undergone changes due to changing times where, the cumbersome practices were replaced. The interest of the farmers in cultivating rice by using Traditional method has decreased as large numbers of farmers were using fertilizers and pesticides in the method of Traditional paddy cultivation to increase the production of rice. SRI paddy was introduced in Madagascar for the benefit all the farmers. The Traditional method needs extra labour and a lot of fertilizers. Farming with modern methods is also expensive using outside inputs. It was noticed that, farmers adopting conventional methods could increase their production only by using expensive inputs such as chemical fertilizers, pesticides and hybrid seeds. It is becoming increasingly difficult for the community to afford these things. It is also known that using chemicals is harmful to the environment. A new method of growing rice is designed for increasing rice production which can use the organic compost, and also the local seed. This method is called "System of Rice Intensification" (SRI).

SRI method differs from the conventional method of rice cultivation as given below

Nursery Management:

Firstly, raised seed bed prepared by a well mixture of FYM and soil either on polythene covers, banana sheaths etc. or on soil. Secondly, seed rate five kg per hectare is sufficient as against 50 to 62.5 kg in conventional method. Thirdly 8 to 12 days aged seedlings transplantation with two small leaves and seed attached to the plant as against 25 days and above in conventional method of rice cultivation.

Transplanting to main field:

Seedlings should be removed carefully from the nursery without disturbing the roots of the plant along with seed and single seedling should be transplanted per spot in the main field. Water in the main field should be drained out before transplanting.

Wide spacing:

Wider spacing of 25 x 25 cm in square pattern should be maintained for better aeration and for easy intercultural operations due to line plantation with the help of rotavator as against 50 to 60 hills per square meter in conventional method.

Weeding:

Naturally weed growth is more in SRI fields because there is no stagnated water. Weeding should be done with rotary weeder/ conoweeder for at least four times with an interval of 10 days starting from tenth day after planting. It churns the soil and the weeds are incorporated in the soil, which in turn serves as organic manure. It helps in increased soil aeration and soli health.

Water management:

The soil should be kept moist but not to break the soil also not saturated by providing alternating wetting and drying.

Manure and fertilizer

Application of more of organic manures i.e. 8 tonnes per ha should be used and apply fertilizer based on soil test results.

AIM

In this context, a study was undertaken in Thiruvarur district of Tamilnadu to note the impact of Traditional as well as SRI method of rice cultivation on the farmers.

OBJECTIVE

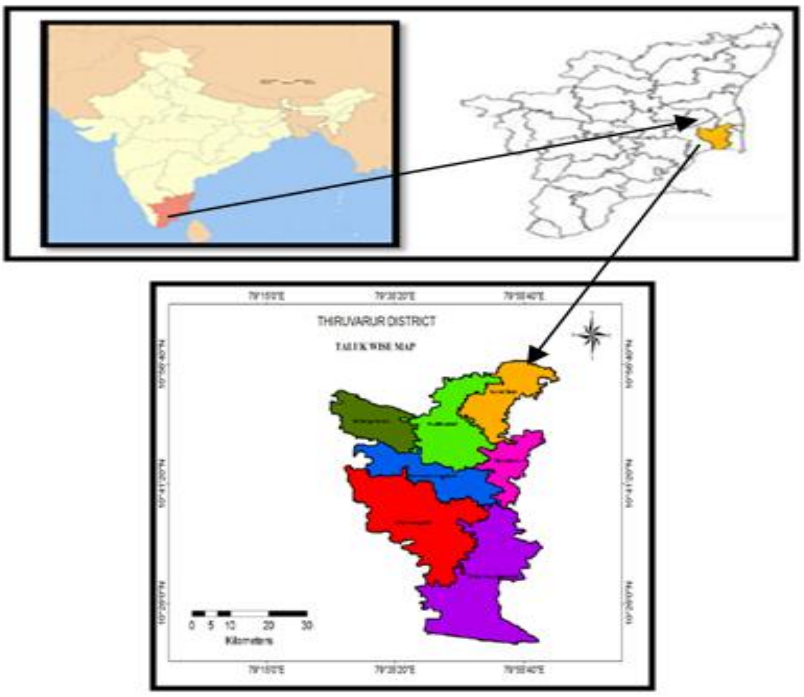
SRI method of rice cultivation is more profitable than conventional method.

II. Methodology

The study is completely based on secondary data which is obtained from the Statistical Department of Thiruvarur district for the years between 2010 and 2015.The study on two methods of paddy cultivation i.e., Traditional and SRI was undertaken in Thiruvarur district of Tamilnadu, where both these methods were practiced.

Location

Thiruvarur district is one of the 32 districts in Tamilnadu state of India. The district occupies on area of 2161 km. it lies between Nagapattinam district the east and Thanjavur district on the west and bounded by paulk strait on the south. The district head quarter is at Thiruvarur town. Thiruvarur is located at10º26'0″ N & 10 º56'40″N and 79º 15'0″ E & 79 º55'40″E (Fig. 1.1)..The town is bounded by Sukumar river in the north, Valaiyar river in the south while the Odambokki river flows through the centre. The town has an average elevation of 3 metres (9.8 ft) from the sea level. The municipality covers an area of 10.47 km^2 (4.04 sq mi). Thiruvarur is situated at a distance of 300 km from Chennai, 24 km (15 mi) from Nagapattinam, 40 km (25 mi) from Karaikal, 40 km (25 mi) from Mayiladuthurai and 56 km (35 mi) from Thanjavur.



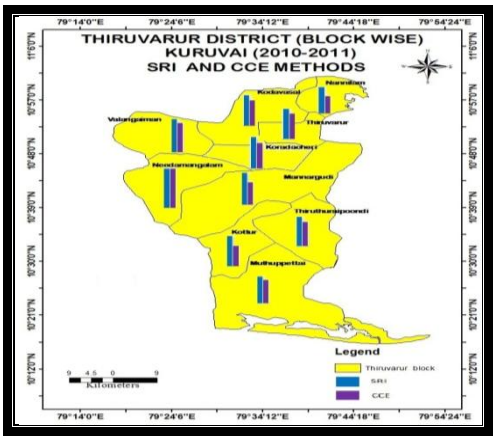
(Fig. 1.1) Location Map of the Study Area

Analysis of SRI and Traditional Methods: 2010-2011
(Kuruvai and Samba Seasons)

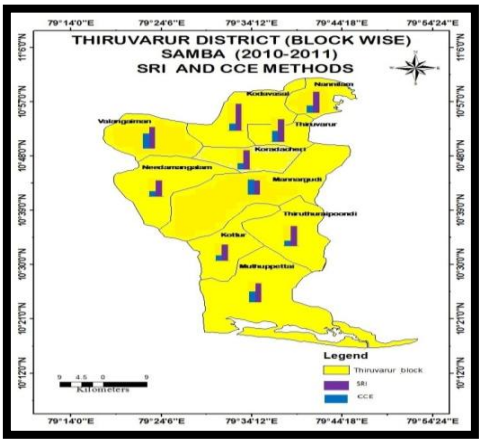
Total yield in case of SRI method in 10 blocks of Thiruvarur district is 70083 kg/ha in kuruvai season, and it is 21021kg/ha in samba season in the same blocks, whereas the total yield in CCE method in same area in kuruvai season is 57406 kg/ha and it is 7563.66 kg/ha in the same area in samba season. The excessive yield obtained in SRI method in kuruvai and samba seasons are 49062 kg/ha and 49842.34 kg/ha respectively than the CCE method.

TABLE 1.5 Yield Obtained in Kuruvai and Samba Seasons (2010-11)

S.No	Block	Yield obtained (kg/ha)			
		Kuruvai		Samba	
		SRI	CCE	SRI	CCE
1	Thiruvarur	6820	5815	2580	1459
2	Thiruturaipoondi	6250	5250	1250	68.75
3	Muthupetai	6172	5272	2560	86
4	Mannargudi	7250	5130	3580	976.8
5	Kottur	6890	4585	1258	280
6	Needamangalam	9088	9088	1256	495.2
7	Valangaiman	7580	6642	3589	2223.25
8	Kudavasal	6980	5815	1680	645
9	Koradacheri	7120	5815	1458	515.66
10	Nannilam	5980	3994	1810	814
	Total	70083	57406	21021	7563.66



(Fig, 1.2)



(Fig, 1.3)

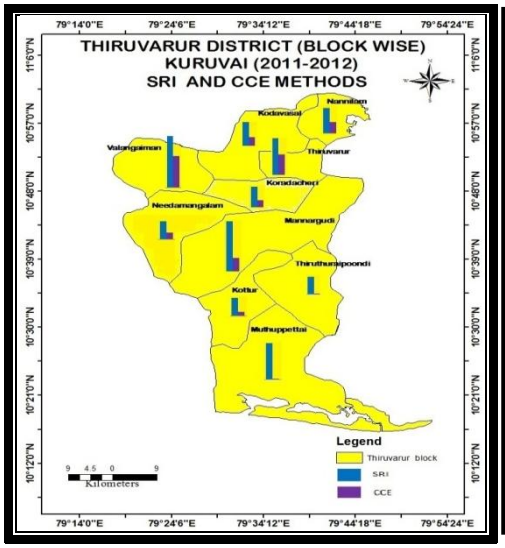
Analysis of SRI and Traditional Methods: 2011-2012
(Kuruvai and Samba Seasons)

In Thiruvarur District which consist of ten blocks, the total yield in SRI method is 73715 kg/ha and 15052 kg/ha in kuruvai and samba season respectively, whereas the total yield in CCE method in same area in kuruvai and samba season is 56993 kg/ha and 10032 kg/ha respectively. The excessive yield obtained in SRI method in kuruvai and samba season is 58663 kg/ha and 46961 kg/ha respectively than the CCE method.

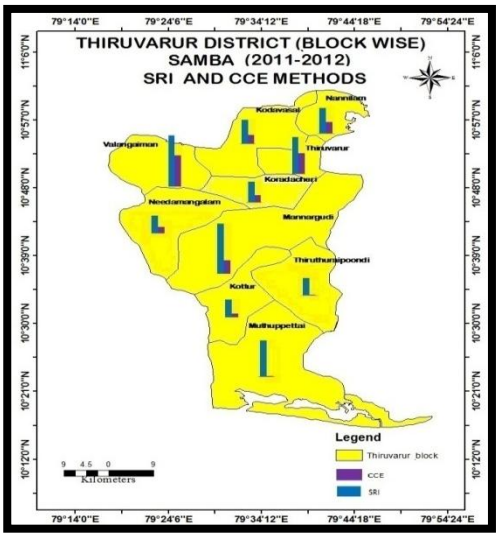
TABLE1.6 Yield Obtained in Kuruvai and Samba Seasons (2011-12)

S.no	Block	Yield obtaine(kg/ha)			
		Kuruvai		Samba	
		SRI	CCE	SRI	CCE
1	Thiruvarur	7208.067	5717.93	1774	892.13
2	thiruturaipoondi	7344.388	5713.81	1714	916.814
3	Muthupetai	7280.709	5709.69	1654	941.499
4	Mannargudi	7317.03	5705.57	1595	966.183
5	Kottur	7353.352	5701.45	1535	990.867
6	Needamangalam	7389.673	5697.33	1475	1015.55
7	Valangaiman	7425.994	5693.21	1416	1040.24
8	Kutavasal	7462.315	5689.08	1356	1064.92
9	Koradacheri	7498.636	5684.96	1296	1089.6

10	Nannilam	7534.958	5680.84	1237	1114.29
	Total	73715	56993	15052	10032.09



Fig, (1.4)



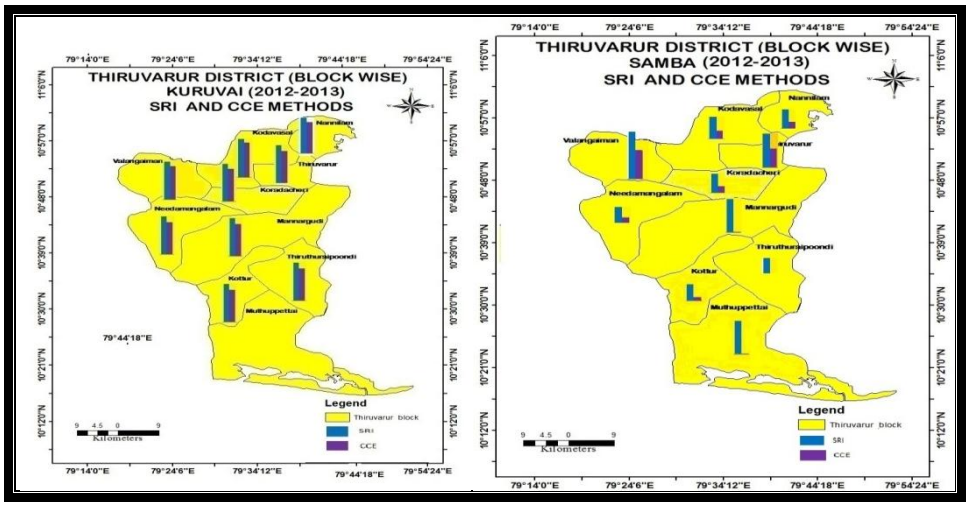
Fig, (1.5)

Analysis of SRI and Traditional Methods: 2012-2013
(Kuruvai and Samba Seasons)

A paddy production of 57592 kg/ha and 21021 kg/ha yield was obtained in the practice of SRI cultivation method in 10 blocks of Thiruvarur district in kuruvai and samba seasons respectively. In the same blocks, the total paddy production in CCE method in samba and kuruvai seasons are 52185.25 kg/ha and 46441 kg/ha respectively. The higher yield obtained in SRI method than in CCE method in kuruvai and samba seasons are 36571 kg/ha and 5744.25 kg/ha respectively.

TABLE1.7 Yield Obtained in Kuruvai and Samba Seasons (2012-13)

S.no	Block	Yield obtained (kg/ha)			
		Kuruvai		Samba	
		SRI	CCE	SRI	CCE
1	Thiruvarur	6558	5350	2580	5337
2	Thiruturaipoondi	5890	5259	1250	4744
3	Muthupetai	0	0	2560	4465
4	Mannargudi	7125	5130	3580	3375
5	Kottur	6580	5150	1258	3830
6	Needamangalam	6510	4393	1256	3795
7	Valangaiman	6250	5544.25	3589	5080
8	Kudavasal	6350	5751	1680	6291
9	Koradacheri	6200	5360	1458	4506
10	Nannilam	5910	5158	1810	5018
	Total	57592	52185.25	21021	46441



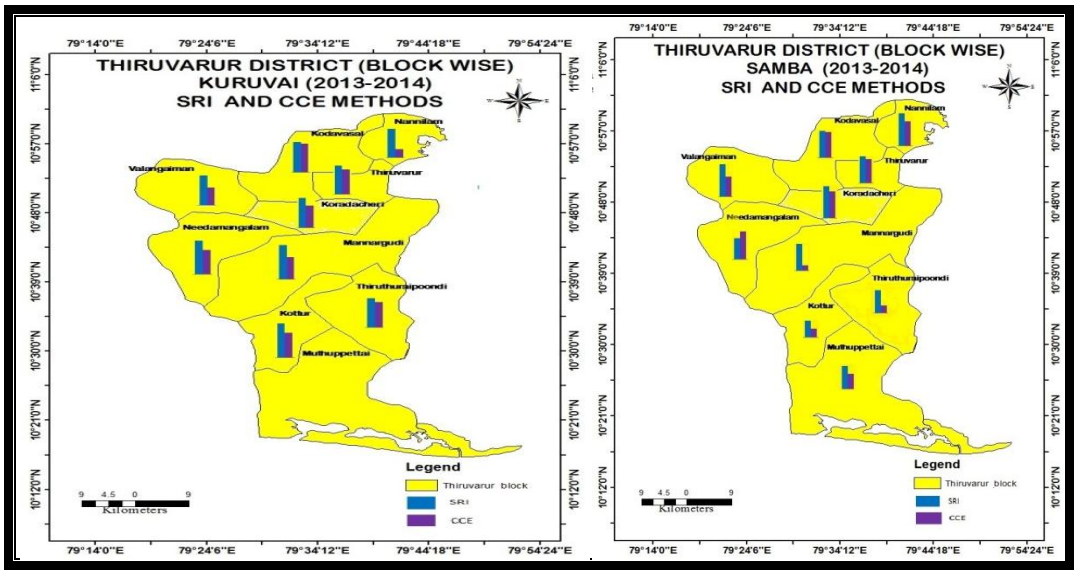
Fig, (1.6) **Fig, (1.7)**

Analysis of SRI and Traditional Methods: 2013-2014
(Kuruvai and Samba Seasons)

Total yield in case of SRI method in 10 blocks of Thiruvarur district is 58670 kg/ha in kuruvai season, and it is 42106 kg/ha in samba season in the same blocks, whereas the total yield in CCE method in same area in kuruvai season is 42129 kg/ha and it is 28684.5 kg/ha in the same area in samba season. The excessive yield obtained in SRI method in kuruvai and samba season is 16564 kg/ha and 13444.5 kg/ha respectively than the CCE method.

TABLE1.8 Yield Obtained in Kuruvai and Samba Seasons (2013-14)

S.no	Block	Yield obtained (kg/ha)			
		Kuruvai		Samba	
		SRI	CCE	SRI	CCE
1	Thiruvarur	6100	5235	4120	3715
2	Thiruturaipoondi	6180	5338	3506	1196
3	Muthupetai	0	0	3600	2371
4	Mannargudi	7250	4737.5	4125	856
5	Kottur	7160	5241	2560	1346
6	Needamangalam	7050	5193	5260	4253
7	Valangaiman	6250	3759	4980	3055.5
8	Kudavasal	6400	6108	4125	3946
9	Koradacheri	6250	4676	4850	4147
10	Nannilam	6030	1844.5	4950	3799
	Total	58670	42129	42106	28684.5



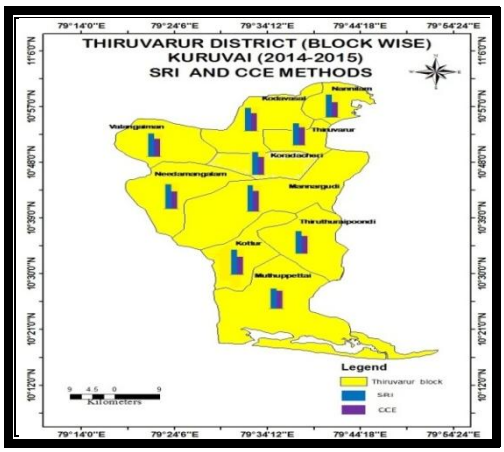
Fig, (1.8) **Fig.(1.9)**

Analysis of SRI and Traditional Methods: 2014-2015
(Kuruvai and Samba Seasons)

Total yield in case of SRI method in 10 blocks of Thiruvarur district is 90620 kg/ha in kuruvai season, and it is 95401 kg/ha in samba season in the same blocks, whereas the total yield in CCE method in same area in kuruvai season is 69682 kg/ha and it is 75957 kg/ha in the same area in samba season. The excessive yield obtained in SRI method in kuruvai and samba seasons are 25219 kg/ha and 6275 kg/ha respectively than the CCE method.

TABLE 1.9 Yield Obtained in Kuruvai and Samba Seasons (2014-15)

S.no	Block	Yield obtained (kg/ha)			
		Kuruvai		Samba	
		SRI	CCE	SRI	CCE
1	Thiruvarur	8560	7066	7850	6470
2	Thiruturaipoondi	8960	7066	8410	6071
3	Muthupetai	7950	7066	8510	7195
4	Mannargudi	10300	8049.5	9800	7191
5	Kottur	9850	7066	8950	6750
6	Needamangalam	9580	6920	9580	8563
7	Valangaiman	9120	6920	8456	6873
8	Kudavasal	8450	6940	8960	6813
9	Koradacheri	8950	6391	8450	6620
10	Nannilam	8900	7066	7985	6548
	Total	90620	69682	95401	95957



Fig, (1.17)

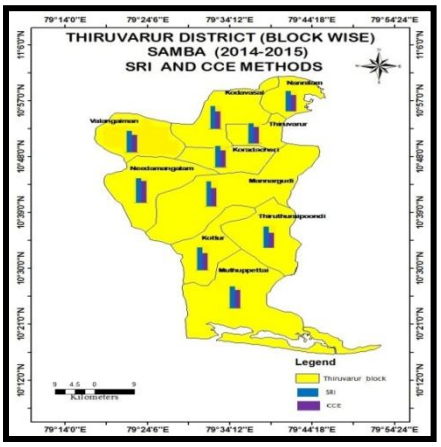


Fig. (1.7)

Cost of Cultivation (Activity-Wise)

Nursery Management

In SRI paddy cultivation 5kgs of seed needed per hectare for nursery management, whereas in the Traditional cultivation method 75kgs of seed needed per hectare for nursery management. The cost of the nursery management in SRI paddy cultivation was 1200 rupees per hectare whereas, for the Traditional paddy nursery management it was 4000 rupees per hectare. Therefore, the farmers gained Rs 2800 per hectare due to SRI cultivation up to nursery stage.

Land Preparation

For Land preparation Rs. 4500/- needed per hectare in SRI cultivation and for the same Rs, 3800/-in traditional cultivation

Method of transplanting

The cost of transplanting incurred in SRI paddy was 3000 rupees per hectare, whereas, in Traditional paddy the cost was, 4200 rupees per hectare. Therefore a gain of Rs 1200 is obtained per hectare for transplantation only due to SRI method of cultivation.

Weed management

By using the weeder supplied by the department, the SRI farmer took up weed management at the cost of Rs.1200without engaging any external labour, while in the Traditional cultivation method the cost was Rs1800 per hectare. Therefore, the SRI farmers gained Rs 600 per hectare for weed management.

Pesticide

For pest management the SRI cultivation expenditure is as same as in Traditional cultivation.

Fertilizer

The cost of fertilizer is Rs.550/- higher in Traditional method than in the SRI cultivation per hectare.

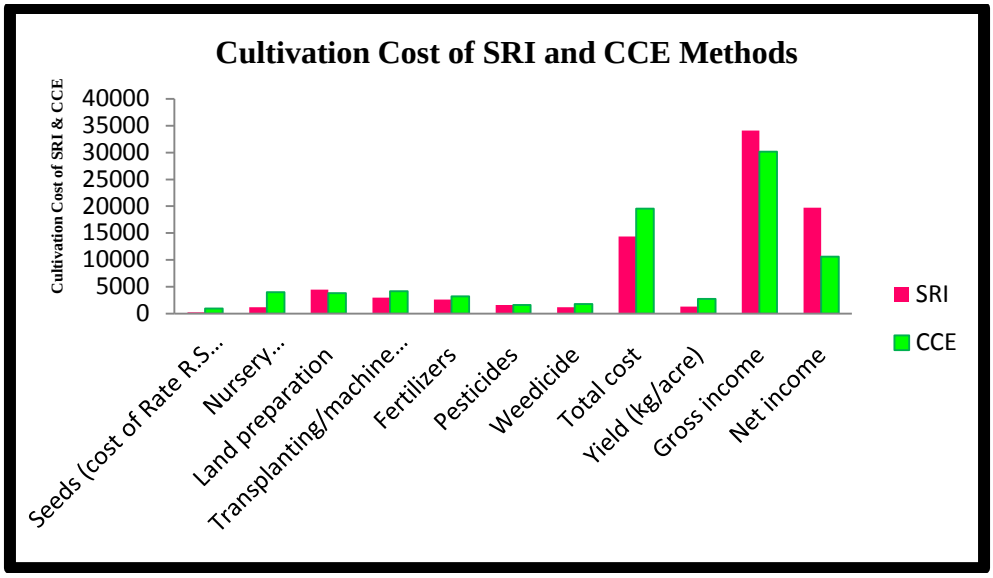
Yield and cost of cultivation

The yield differences were observed in case of SRI and Traditional paddy cultivation methods. While the farmer following SRI method could get 1300 kg of rice per acre, the farmer practicing the Traditional method of paddy cultivation could get 2765 kg of rice per acre. The total cost of cultivation per hectare for SRI method was Rs.14375 while in Traditional paddy cultivation it was Rs.19560. The cross income is Rs.34100 and the net income is Rs.19725 in SRI cultivation, whereas in Traditional paddy cultivation the cross income is Rs.30145 and the net income is Rs.10585. Therefore, the profits gained due to SRI cultivation was Rs.9240 per acre.

The cost and expenditure of SRI paddy and Traditional paddy cultivation of sample farmers are given in the table as shown below.

TABLE 1.10 The cultivation cost of SRI and Traditional paddy methods

S.NO	ITEMS	TECHNIC	
		PADDY(SRI) TECHNIC	PADDY(TRADITIONAL)
1	Seeds (cost of Rate R.S 28.10 Kg seed.)	225	960
2	Nursery management/dapagnuysery	1200	4000
3	Land preparation	4500	3800
4	Transplanting/machine Transplanting	3000	4200
5	Fertilizers	2650	3200
6	Pesticides	1600	1600
7	Weedicide	1200	1800
8	Total cost	14375	19560
9	Yield (kg/acre)	1300	2765
10	Gross income	34100	30145
11	Net income	19725	10585



Fig, (1.19)

III. Conclusion

In the study area during the study period from the available data both in Kuruvai and Samba seasons the yield of Rice production is 20% to 40% higher in SRI cultivation method than the Traditional cultivation method. Further the data shows that the cultivation cost also less in the SRI method than the Traditional cultivation method but the yield is higher in SRI method than the Traditional method.

Rice crop normally requires more water but 50% water saved in SRI method. Increased yields of 20-50% or more, a reduction in seed use of 80-90% are significance in SRI method .By reducing inputs of seed, water, chemical fertilizers and lower production costs increases farmers' incomes and increases the profitability of rice farming. Use of pesticides can be decreased because SRI plants are stronger and healthier. Disease pressure is reduced when plants are widely spaced. Use of chemical fertilizer can be reduced significantly in SRI cultivation method. Less fertilizer is needed to achieve a targeted production level and hence soils improve in structure and become more fertile through periodic organic matter amendment. Environment is protected as less use of chemical fertilizer and pesticide. Because of the reason that plants are stronger and more deeply rooted, SRI crop stands show greater resistance towards drought, strong winds and storms. Also SRI management usually shortens their crop cycle by 1-2 weeks. This frees up their land for other uses, and reduces their crops' exposure to climatic stresses and pest and disease risks.

Recommendations

SRI method is the solution for increase in rice production and productivity. Resources like water, soil and environment can be saved. Awareness about SRI technology should be created and traditional mind set

should be removed among the formers. Instruments like markers and weeders should be made available easily. Government should ensure easy access to Bank loans and implement subsidy scheme for development of this cultivation.

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