



Knowledge Gap Causing Discontinuance of SRI: A Study in Tribal Region of Odisha

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2022/v40i111734

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/92400>

Original Research Article

Received 23 August 2022

Accepted 27 October 2022

Published 14 November 2022

ABSTRACT

System of Rice Intensification (SRI) method is being ideally suited to the small farmers in India where rice productivity is comparatively low. But, it has been observed that the farmers are not enthusiastic to continue the practice in spite of all efforts made. Inadequate knowledge about the practices might be the reasons for the discontinuance of the method. A study was therefore, conducted with 96 farmers in the tribal region of Sundargarh district in Odisha to assess the knowledge deficiencies that causing discontinuance of SRI. The findings revealed that the farmers had inadequate knowledge on raising nursery bed at 80-100 cms height, putting single sprouted seed in line in nursery bed, sub-matting at two meters distance, putting seedlings in a thin metal sheet for easy transplanting, use of recommended quantity of well decomposed FYM/manure per hectare, green manuring and vermicomposting to supplement organic manure, minimum of four weeding at ten days interval, alternate drying and wetting of the main field, light irrigation during hair line cracks and keeping 2-3 cms standing water after flowering. Socio – economic attributes like family size, housing pattern, social participation, education, use of agricultural implements, extension contact and annual income had significant influence in increasing knowledge level of the

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respondents. It is therefore suggested that the extension officials of the state department of Agriculture and Non- Government Organizations promoting SRI have to take possible approaches to expose the respondents further particularly with poor knowledge on practices enabling them to realize the benefits of all these practices and may continue SRI method of rice cultivation for better production till they get better technology.

Keywords: SRI; knowledge; respondents; adoption; tribal; Odisha; rice; paddy.

1. INTRODUCTION

India is the second highest producer of rice after China covering around 45.5 million hectares having production of 105.31 million tons with productivity of only 2393 Kg per hectare. To ensure food security in the rice consuming countries of the world, rice production need to be increased around 50 percent by 2025. System of Rice Intensification (SRI) has more relative advantage of low cost and sustainable alternative towards food security [1]. The method reduces the seed quantity, judicious use of irrigation water and give higher yield [2]. It attributed vigorous and healthy growth of rice plants along with more reproductive tillers and leaves ensuring greater resource utilization [3]. The method also improve the growth and function of rice plants root system as well as enhance the numbers and diversity of soil biota resulting plant healthy and productive [4]. Hence, SRI method of rice cultivation is the sustainable alternative to conventional rice production system addressing food security and poverty [1].

System of Rice Intensification seems to be ideally suited to the small farmers in a country like India where rice productivity comparatively low [5,6]. The department of Agriculture and Farmers Empowerment, Govt. of Odisha has made intensive efforts to promote SRI method of rice cultivation. It has been observed that the farmers are not enthusiastic to continue SRI method in spite of all the efforts and incentives provided [7,8]. At the same time, gain in complete knowledge leads to complete adoption by the farmers using recommended practices [9]. A study was therefore designed to assess the knowledge level of the growers on SRI method of rice cultivation and locate the deficiencies to take remedial measures for its continuance.

2. MATERIALS AND METHODS

The study was conducted in the tribal dominated district of Maurbhanja in odisha during 2020. A sample respondent of 96 growers discontinuing SRI method were randomly selected from 10-

gram panchayats covering five blocks in the district. The data was collected personally through a semi-structured interview schedule pretested earlier. Knowledge about nursery raising, main field preparation, transplanting, nutrient weed and water management were selected as the variables for the study. The data collected on the scale point of fully, partially and not known over the framed statements were analyzed with the score value of 3, 2 and 1 respectively. Statistical tools such as mean score, gap percentage and path analysis were employed to reveal the results.

3. RESULTS AND DISCUSSION

SRI requires well prepared nursery bed as 8–12 days old seedlings are to be transplanted. The growers have to prepare well pulverized seed bed, showing sprouted seeds, water management and application of well decomposed cow dung etc. It is revealed (Table 1) that the respondents had better knowledge on maintaining well pulverized soil, proper levelling of bed, drainage channel on all sides, land requirement for raising seedling in transplanting of one hectare area, putting equal amount of well mixed farm yard manure and soil as well as preferable bed size of 1 x 10 meters.

Raising bed at 80-100 cms height makes the soil well drained and good establishment of seedlings. Putting single sprouted seeds in line at appropriate depth ensure good plant stand. Poor knowledge observed on these aspects may be the factors for poor plant stand in nursery resulting unsatisfactory yield.

Good puddling, proper levelling, well drainage, sub-plotting, drainage channel, marking at 25 x 25 distance and not keeping standing water are the recommendations in main field preparation. The respondents had good knowledge (Table 2) on proper levelling with good drainage facility, good puddling and levelling, drainage channels at both sides of sub-plotting, not keeping standing water during transplanting as well as marking at 25 x 25 cms for transplanting. It is

recommended to make sub-plotting of the main field at 2 meters distance for better supervision, keeping moist of the soil by irrigating in the channel and better cultural management operations. Poor knowledge observed on these aspects may create inconveniences in weeding, fertilizer and plant protection measures. The respondents therefore need training for knowledge and skill competency on sub-plotting at two meter distance with drainage channel to make the plant healthy and productive [10-12].

Young seedlings of 8-12 days are recommended for transplanting in SRI method. The seedlings are not to be damaged while uprooting or transplanting in the main field. Moreover, the seeds should remain intact with the seedling and transplanted at shallow depth. The seedlings are to be taken with a thin metal sheet for easy detachment and transplanting which was not being adopted indicating poor knowledge of the respondents. However, the respondents had better knowledge on not washing the seedlings

after uprooting, not removing seeds from seedlings, transplanting of 8-12 days seedlings and planting one seedlings per hill.

The concept of SRI usually in organic way for which 10 tons well decomposed farm yard manure or compost are recommended. Green manuring and vermicompost can be used to supplement manure. The state department of Agriculture has also advised for 50.00% of the recommended dose of NPK if, adequate amount of organic manure not available. But, the respondents had not adequate knowledge (Table 4) on application of compost/ FYM, green manuring and vermicompost use. Application of recommended dose of organic manure are essential in SRI method for which the respondents need further exposure to realize the benefits. However, the respondents had better knowledge on using half of the recommended dose of NPK, application of potash in two and nitrogen in three splits.

Table 1. Knowledge gap on nursery raising (n=96)

Sl. No.	Knowledge	Mean Score	Gap %
1.	100 sq. meter space required for seedling of 1ha. area	2.69	10.33
2.	Preferable bed size of 1 x 10 meters	2.52	16.00
3.	Raising bed at 80-100 cms height	2.25	25.00
4.	Putting equal amount of well mixed soil and FYM	2.67	11.00
5.	Drainage channel on all sides	3.00	0.00
6.	Well pulverized soil	3.00	0.00
7.	Leveling of bed	3.00	0.00
8.	Showing Sprouted seeds in line	2.28	24.00

(Maximum Obtainable Score-3)

Table 2. Knowledge gap on main field preparation (n=96)

Sl. No.	Knowledge	Mean Score	Gap (%)
1.	Proper leveling with good drainage facility	2.99	0.33
2.	Good puddling and leveling	2.98	0.67
3.	Sub-plotting at 2 meters distance	2.28	24.00
4.	Drainage channels on both sides of sub-plotting	2.95	1.67
5.	Marking at 25 x 25 cms for transplanting	2.68	10.67
6.	No standing water during transplanting	2.95	1.67

(Maximum Obtainable Score-3)

Table 3. Knowledge gap on transplanting (n=96)

Sl. No.	Knowledge	Mean Score	Gap (%)
1.	Transplanting 8-12 days seedlings	2.86	4.67
2.	Putting seedlings in a thin metal sheet for transplanting	1.51	49.67
3.	Planting one seedling per hill	2.70	10.00
4.	Not removing seeds from the seedlings	2.94	2.00
5.	Not washing the seeds after uprooting	2.94	2.00

(Maximum Obtainable Score-3)

Table 4. Knowledge on nutrient management (n=96)

Sl. No.	Knowledge	Mean Score	Rank
1.	Applying 10 tons of compost / FYM per ha.	2.28	24.00
2.	Green manuring practice	2.20	26.67
3.	Applying vermicompost	2.23	25.67
4.	Using half of the recommended dose of NPK	2.84	5.33
5.	Nitrogen to applied in three splits	2.70	10.00
6.	Potash to be applied in two splits	2.91	3.00

(Maximum Obtainable Score-3)

As standing water not recommended, weed population are more in SRI method. Therefore, minimum of four weeding are recommended. Moreover weeding has to be done with cono weeder and incorporate in to the soil to facilitate more aeration at plant root levels along with growth of diverse soil micro organisms that increase nutrient availability to the plant. The respondents had better knowledge on various aspects of weed management (Table 5) particularly using cono/mandva weeder for weeding, irrigating one day before weeding, uprooting weeding manually near to the plant and incorporating weeds in to the soil to add organic matter. It has been recommended minimum of four weeding at 10 days interval not only to control weeds but providing more aeration at the root zone. Poor knowledge observed on number of weeding require for further sensitization to realize the benefits.

Flood irrigation is not recommended in SRI. Rather, soil should kept be kept in wet condition and need light irrigation during hairline cracks noticed. It is observed from Table 6 that the respondents had good knowledge on maintaining water at soil saturation, keeping drainage channel around the sub-plot and to some extent draining water after 20 days of flowering. Poor knowledge were observed on light irrigation during hairline cracks, alternate drying and wetting of the field as well as keeping standing water of 2–3 cms after flowering that needs further sensitization.

Comparative analysis (Table 7) revealed that the respondents had better knowledge on main field preparation. Considerable deficiencies were observed on water and nutrient management, transplanting, weed management as well as nursery raising.

Table 5. Knowledge gap on weed management (n=96)

Sl. No.	Knowledge	Mean Score	Gap (%)
1.	Irrigation one day before weeding	2.92	2.67
2.	Using cono/mandava weeder for weeding	2.94	2.00
3.	Minimum of 4 weeding at 10 days interval	2.07	31.00
4.	Incorporating weeds in to the soil	2.52	16.00
5.	Uprooting weeds manually near to the plant	2.91	3.00

(Maximum Obtainable Score-3)

Table 6. Knowledge gap on water management (n=96)

Sl. No.	Knowledge	Mean Score	Gap (%)
1.	Maintaining water at soil saturation	2.96	1.33
2.	Keeping drainage channel	2.95	1.67
3.	Alternate drying and wetting of the field	2.17	27.67
4.	Light irrigation during hairline cracks	1.73	42.33
5.	Standing water of 2-3 cms after flowering	2.23	25.67
6.	Draining water after 20 days of flowering	2.50	16.67

(Maximum Obtainable Score-3)

Table 7. Comparative knowledge gap of the respondents (n=96)

Sl. No.	Knowledge	Mean Score	Gap (%)
1.	Nursery raising	2.73	9.00
2.	Main field preparation	2.81	6.33
3.	Transplanting	2.59	13.67
4.	Nutrient management	2.37	21.00
5.	Water management	2.42	19.33
6.	Weed management	2.67	11.00

(Maximum obtainable score-3)

Table 8. Path analysis of socio-economics attributes influencing knowledge level

Sl. No.	Attribute	Total effect	Total direct effect	Total indirect reflect	Substantial effect		
					I	II	III
X ₁	Age	0.012	-0.027	0.039	0.109x ₅	0.036x ₂	0.016x ₁
X ₂	Education	0.025	-0.247	0.272	0.157	-0.139x ₁₂	-0.059x ₇
X ₃	Caste	0.091	-0.137	0.228	0.113x ₄	-0.73x ₆	-0.034x ₁₃
X ₄	Housing Pattern	0.256	0.129	0.127	-0.256x ₁₂	0.186x ₁₃	-0.042x ₉
X ₅	Holding size	0.240	0.110	0.130	-0.144x ₆	0.105x ₄	-0.042x ₁
X ₆	Social participation	0.278	0.032	0.246	-0.026x ₁₂	0.167x ₉	0.008x ₁₁
X ₇	Cosmopoliteness	0.093	-0.043	0.136	-0.223x ₃	-0.172x ₈	-0.074x ₇
X ₈	Extension contest	0.275	0.140	0.135	-0.181x ₁₁	0.117x ₇	-0.062x ₁₂
X ₉	Use of agricultural implements	0.639	0.611	0.028	-0.203x ₂	0.194x ₁₂	-0.023x ₅
X ₁₀	Annual income	0.346	0.160	0.186	-0.206x ₇	0.167x ₉	0.008x ₁₂
X ₁₁	Family type	0.131	0.520	-0.389	-0.223x ₅	-0.172x ₈	-0.074x ₉
X ₁₂	Family size	0.062	-0.482	0.544	-0.081x ₄	0.077x ₇	-0.062x ₅
X ₁₃	Occupation	-0.111	-0.040	-0.071	-0.195x ₁₀	0.114x ₂	-0.023x ₃

Highest indirect effect – family size, Residual effect – 0.037

Attempt was made to assess the influence of socio – economic attributes of the respondents influencing their knowledge level. It is observed from path analysis (Table 8) that use of Agricultural implements had exhibited highest direct effect followed by family type, family size and education. Similarly, the attribute family size had the highest indirect effect having associations with housing pattern, social participation, education, use of Agricultural implements, extension contact and annual income. Hence, the attribute family size channelized through housing pattern, social participation, and education, use of agricultural implements, extension contact and annual income could exhibit significant influence in increasing the knowledge level of the respondents on SRI method of rice cultivation [13-15]. The residual effect being 0.037 inferred that 3.70% of the variation in this relation could not be explained.

4. CONCLUSION

System of Rice Intensification (SRI) is a simple methodology to increase rice productivity by

changing the management of soil, water, plants and nutrients. In spite of intensive efforts by the state department of Agriculture, farmers are not developing enthusiasm to continue the practice. The study revealed that the respondent had poor knowledge regarding raising nursery bed at 80-100 cms height, putting single sprouted see in nursery bed, sub-plotting at two meters distance, putting seedlings in a thin metal sheet for easy transplanting, application of recommended dose of compost or FYM green manuring and vermicompost application, minimum of four weeding at 10 days interval, alternate drying and wetting of the main field, provide light irrigation during hairline cracks noticed and keeping 2–3 cms standing water after flowering. Socio – economic attributes like family size, housing pattern, social participation, education, use of Agriculture implements, extension contact and annual income had significant influence in increasing knowledge level of the respondents.

Complete knowledge leads to complete adoption of the recommended practices. Poor knowledge observed from the study were the pertinent factors for successful crop raising. Hence, further

exposure is essentially required to expose them further through various extension approaches to realize the benefits of these practices and may continue SRI method of rice cultivation till get better technology.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:

The peer review history for this paper can be accessed here:

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