



# **Extent of Adoption of System of Rice Intensification (SRI) Technology for Sustainable Rice Production in Tripura, India**

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## **Authors' contributions**

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

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## **ABSTRACT**

The present study was conducted on 240 number of respondents randomly selected from forty (40) number of villages under the Gomati and North district of Tripura. For finding out the extent of adoption of system of rice intensification (SRI) technology, 20 independent and one dependent variable were selected for the study. Data were collected through personal interviews during the Aman season of 2022–23. For data analysis, frequency; percentage; ranking and coefficient of correlation was carried out. It was revealed that around 60.00% of the paddy farmer fall under medium level of adoption and only 26.67% of the paddy farmers had a high level of adoption. It was

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evident that age, education, annual income, income from paddy cultivation, land holding, innovation proneness, training exposure, Government subsidies and market orientation are found to be positively correlated and significant with adoption of SRI practices and major constraint faced by respondents was identified as labour constraints as priority constraints faced by most farmers followed by lack of technical knowledge.

**Keywords:** *Socio-economic status; SRI; adoption; innovation; constraints; mean percent score (MPS); ranking and coefficient of correlation.*

## 1. INTRODUCTION

“System of rice intensification (SRI) is a synergistic management strategy that involves four major components of rice cultivation, such as planting, weeding, irrigation, and nutrient management. SRI has been shown to help increase yield and substantially reduce water and other input requirements by altering crop, soil, water, and nutrient management practices” (Dahiru, 2018). In 1980s it was first developed by a Jesus Priest Father Henry D Laulanae in Medagaskar as system of rice intensification. “This new set of practices greatly improved the growing environment for rice plants, evoking more productive phenotypes from all rice genotypes with a host of improved practices under specific recommendations viz., minimum water use, and single transplantation of young seedling in a square pattern of spacing through efficient soil and nutrient management rather than use of new or purchased external inputs. It is been observed that system of rice intensification (SRI) practices results in a significant decrease of inputs such as seeds, chemical fertilizers and water supply which has a direct effects on production costs” (Johnson and Vijayaragavan, 2011). Tripura is the third smallest state among the north-eastern states but second largest producer of rice after Assam. “In Tripura, rice is the major cereal crop and food security strictly depends on rice production, as no other cereals are grown by the farmers of this state due to dietary habit and agro-climatic condition. Department of Agriculture has implemented strategic efforts to promote system of rice intensification (SRI) method of rice cultivation for enhancement of rice productivity and thereby to attain food self-sufficiency. Tripura was the first among North Eastern state to adopt, assess and promote system of rice intensification (SRI) technology since 1999. The adoption of the system of rice intensification (SRI) technology in paddy cultivation could increase productivity of rice from 2.5 t/ha to about 3.5 t/ha. The State Department of Agriculture has taken initiatives to promote

SRI paddy cultivation techniques, but the expected result is yet to be achieved. Keeping these facts in view, a research study was conducted with the objective of evaluating the extent of adoption and factors influencing the adoption of SRI paddy cultivation technology.

### 1.1 Objectives of the Study the Study

1. To study the socio-economic, Socio-personal and socio-psychological characteristics of paddy farmers
2. To study the extent of adoption and the association ship between dependent and independent variables of adoption
3. To study the constraints faced by the farmers adopting System of rice intensification (SRI) practices.

## 2. MATERIALS AND METHODS

The present study was carried out in Gomati and North district of Tripura during 2022-23. Ex-post facto research design was employed. Nineteen (20) independent variables such as age, sex, family type, family size, education, annual income, income from paddy cultivation, total operational land holding, total operational land under SRI, cropping intensity, risk orientation, mass media exposure, social participation, source of information, innovation proneness, economic motivation, training exposure, attitude, Govt. subsidies, Market orientation and one dependent variable viz. extent of adoption. From two districts, 40 numbers of villages was selected randomly, from the selected villages 240 numbers of farmers were selected randomly and interviewed personally with the help of pretested survey schedule developed for the study. Frequency, percentage and rank were used as statistical measures to analyze the data. Mean percent score (MPS) was calculated for each of the constraint on the basis of their degree of magnitude and ranked in order of their significance.

### 3. RESULTS AND DISCUSSION

An investigation was carried out on the adoption of selected recommended SRI technology practices followed by the farmers. In total, fifteen selected cultivation practices of SRI technology were studied in terms of the number of adopters as well as the extent and nature of adoption of each individual practice (Table 1).

**Selection of Irrigated Land:** Rice can be cultivated in a various range of soil types, from sandy loams to clay soils. For cultivation of rice crops clay loams is best soil. Although rice crops can withstand various group of soil but mostly it prefers acidic soils with a pH between 5.5 to 6.5. It was observed that majorities (57.5%) of respondent were reported to have good irrigated land followed by 42.5% with semi and rain fed land. The following results are in accordance with that of findings of Debbarma et al. (2018).

**Land Preparation:** The main paddy field is prepared and land is levelled with little standing water a day before seedling transplanting. There should be 30 cm wide channels at every 2 meters interval. Perfect levelling is the pre-requisite for proper water management and good crop stand Kumar et al., (2007). It was observed that majority (77.92%) of the respondents adopted the scientific way of land preparation of the main field followed by 53.00% partial adoption.

**Use of HYV/Hybrid Seeds:** It has been observed that any variety, whether high yielding or land race, shows a higher response under SRI. The genetic potential of any variety or cultivar is expressed better in SRI because of the changed growing environment. Even though hybrids seem to fair well when compared to other cultivars Adhikari et al., (2010). It was found that only 55.83% of respondent were able to get good quality HYV/Hybrid seed from various Govt. source and other are growing local or pre owned seeds.

**Seed Treatment:** Seed treatment with fungicides plays an important role in protecting the seeds and seedlings from different seed and soil borne diseases and insect pests affecting crop emergence and its growth. It was found that only 50 percent have adopted the practice followed by 33.33% no adoption at all and for proper adoption of this practice by the farmers may requires effective extension strategies making

the appropriate chemical pesticides/bio-pesticides and equipment's available to the farmers and informing its important with the help of training and demonstration.

**Recommended Seed Rate per ha:** In SRI cultivation about 2 kg of seeds (5 kg / ha) is required to transplant in one acre of land. Paddy seeds should be evenly spread to avoid crowding of seedlings, when it's germinated and care should be taken that no seeds should touch each other as much as possible. From the Table 1, It is been observed that majority (48.55%) of farmers followed recommended seed rate.

**Application of Organic Manure in Nursery Raising:** Nursery bed is prepared with application of farm yard manures (FYM) and soil in four alternating layers. The organic manure should be mixed properly that will help germinate the seeds and also minimize root damage during seedling pulling out from the bed. Majority of the respondents (42.92%) showed no adoption of recommended practice in nursery management and only 31.25% fully adopted the technology.

**Age of Seedling (8-12 days old):** The reason for using the younger seedlings of 10-12 days age old is for profuse tillering and to have a potential for producing maximum number of tillers and roots simultaneously. It was observed that majority (40.00%) of farmers used younger seedling followed by 32.50% of farmers who use beyond recommended age of seedlings.

**Transplanting Spacing (25x25 cm):** Result in the Table 1 also revealed that 38.33% of respondents were unable to adopt for maintaining of transplanting spacing in SRI technology, while only 36.25% of respondent were able to adopt the recommended transplanting spacing (25x25 cm). Less adoption of transplanting spacing may be due to the fact it is labour intensive activity. The reason for using wider spacing is to obtaining the optimum number of tillers/ panicles for maximum yield.

**Number of Seedlings/Hill (1 Seedlings/Hill):** In SRI technology, it is recommended to transplant only one seedling per hill to avoid minimum trauma to the roots and to avoid root competition and to obtaining the optimum number of tillers/ panicles for maximum yield. It was found that only 43.33% of farmers were tried to adopt the practice partially followed by 32.92% of farmers who fully full adopted the recommended number of seedling for transplanting.

#### Application of Recommended dose of NPK:

As much as 74.17 per cent of respondent fully adopted recommended NPK- fertilizer dose and while only 25.83 per cent of respondent partially adopted the recommended NPK- fertilizer dose. Partial adoption of recommended dose of NPK may be due to lack of awareness or misinformation. It may be concluded that majority of the farmers had used recommended dose fertilizer on their crops.

**Application of Organic Manure:** "It was revealed that majority (42.92%) of respondents applied organic manure for paddy cultivation. Organic manures are recommended in SRI cultivation, as they provide better response to crop growth and nutrient supply. The finding is supported by finding of Singh (2004).

**Weed Management:** "It was found that majority of farmer (49.17%) have effectively managed weed infestation. Alternate wetting and drying in SRI results in excessive weed growth leads to immense loss in yield if remain unchecked for longer time. In SRI, the weeds are incorporated by operating cono weeder between rows at the right time, which also supply nutrients to the crop as green manures. The foremost advantage of

using a mechanical weeder is for minimizing time requirement and also adds organic matter to the soil. This gives the benefits of cultivating a green manure crop. The following results are in accordance with that of findings of Adhikari et al., (2010).

**Plant Protection:** Majority of the respondents 41.67% were found in full adoption and 42.50% were found in partial adoption in plant protection of transplanted crop in SRI cultivation by the farmers. The reason is that to reduce the critical crop weed competition (30-45 days) after sowing otherwise yield get reduced to 15-40%. The following findings is supported by Prasad (2006).

**Irrigation (Alternative Wetting and Drying):** "It is recommended that up to panicle initiation stage, to irrigate the field to 2.5 cm after the previously irrigated water disappears and hairline cracks develop and it is important point to remember that in SRI cultivation rice does not require flood water and it is enough to keep the soil moist" (Adhikari et al., 2010). It was observed that majority of farmers have adopted the practice followed by 33.33 percent who partially adopted.

**Table 1. Distribution of respondents based on extent of adoption of system of rice intensification (SRI) technology among the farmers (n=240)**

Package of practices	Extent of Adoption					
	Full adoption		Partial adoption		No adoption	
	F	P	F	P	F	P
Selection of irrigated land	138	57.50	102	42.50	0	0.00
Land preparation	187	77.92	53	22.08	0	0.00
Use of HYV/Hybrid seeds	134	55.83	50	20.83	56	23.33
Seed treatment (2-3 gm/kg of seeds)	120	50.00	40	16.67	80	33.33
Seed rate/ha (5 kg per ha)	117	48.55	80	33.20	44	18.26
Application of organic manure in nursery raising	75	31.25	62	25.83	103	42.92
Plant protection in nursery	60	25.00	108	45.00	72	30.00
Age of seedling (8-12 days)	96	40.00	66	27.50	78	32.50
Transplanting spacing (25 x25 cm)	87	36.25	61	25.42	92	38.33
1-2 number of seedlings/ hills	79	32.92	104	43.33	57	23.75
Application of recommended dose of NPK	178	74.17	62	25.83	0	0.00
Application of organic manure (10-12 t/ha)	103	42.92	87	36.25	50	20.83
Weed management (Mechanical weeder)	118	49.17	102	42.50	20	8.33
Plant protection	100	41.67	90	37.50	50	20.83
Alternative wetting and drying	97	40.42	80	33.33	63	26.25

**Table 2. Distribution of respondents based on their extent of overall adoption scores on recommended package of practices of SRI technology (n=240)**

Category	Frequency	Percentage
Low	20	13.33
Medium	90	60.00
High	40	26.67
<b>Total</b>	<b>150</b>	<b>100</b>

**Extent of Adoption of SRI Technology:** It was revealed from Table 2 that 60 per cent of the paddy farmers had a medium level of adoption with respect to SRI paddy cultivation practices, while 26.67 per cent of the respondents had a high level of adoption. The same result was also reported by Debbarma et al. (2018) and Singh and Varshney (2010), Kumari & Prakash (2020).

Table 3 Indicates that age, education, annual income, income from paddy cultivation, land holding, innovation proneness, training exposure, Government subsidies and market orientation are found to be positively correlated and significant with adoption of SRI practices and the result was also supported by Kumar et al., (2014), Meshram, (2012), Devi & Ponnarasi (2009), Karki (2010), Thatchinamoorthy and Rexlin, (2014), Ray and Raj, (2014), Kacharo,

(2007), Singha & Baruah, (2011) and Singha et al., (2012).

**Major Constraints Faced by Farmers in the Adoption of SRI Technology:** "It was evident from Table 4 that the major constraint faced by respondents was identified as labour constraints as priority constraints faced by most of the farmers, as labour availability is less and high wage cost, therefore to overcome this problem, farmers need to use farm machinery starting from transplanting to harvesting of the crop. Lack of technical knowledge ranked second. Therefore, to overcome this problem, seminars, workshops, and training programmes should be conducted. Extension constraints ranked third. Therefore, extension personnel should address the information relating to farms, pay regular visits to the villages and provide training according to their present needs.

**Table 3. Correlation of personal, socio-psychological and communication characteristics with the extent of adoption of SRI technology (n=240)**

Characteristics	Correlation coefficient (r)
Age	0.427**
Sex	-0.17
Family type	0.154
Family size	0.146
Education	0.352**
Annual income	0.243*
Income from paddy cultivation	0.258*
Total operational land holding (acre)	0.228**
Total operational land under SRI	-0.148
Cropping intensity	0.197
Risk orientation	0.241
Mass media exposure	0.199
Social participation	0.101
Source of information	0.124
Innovation proneness	0.292*
Economic motivation	0.147
Training exposure	0.510**
Attitude	0.178
Govt. subsidies	0.484**
Market orientation	0.254**

\*significant at 0.05 level of significance

\*\* Significant at 0.01 level of significance

**Table 4. Constraints in adoption of SRI technology faced by farmers**

Constraints	Mean score	Ranking
Labour constraints	0.67	I
Technical knowledge	0.62	II
Extension and information	0.59	III
Govt. policy and support	0.54	IV
Financial	0.51	V
Marketing and remuneration	0.49	VI

The farmers should be made aware to avail the benefits from different government schemes by organizing periodic village meetings. The 4<sup>th</sup> constraint was the policy level constraints. Govt. policy and support constraints can be address by providing incentives or subsidies, setting up storage facilities, and encouraging the farmers to go for large-scale cultivation can have a huge impact on the extent of SRI cultivation technology and the productivity of paddy. Financial constraints ranked fifth. Farmers faced problems in obtaining loans from the banks. This problem can be avoided by creating awareness of the procedure of availing loans from various financial institutions. Marketing and remuneration is the 6<sup>th</sup> constraint faced by farmers. Marketing constraint can be overcome by creating proper marketing infrastructures and educating the farmers about the proper system of market functions. And also the government should take the initiative to procure the produce from the farmers so as to provide a sense of guarantee of minimum crop loss. Similar finding was observed by Debberma et al. (2018) & Singh (2003).

#### 4. CONCLUSION

System of rice intensification (SRI) is a very beneficial for rice production that may be helpful in increasing the productivity and income of farmers in comparison to conventional farming. Variables like formal information sources, extension contact, scientific orientation, training exposure, attitude, age, mass media, and market orientation were found important in influencing the SRI technology adoption by the farmers. As most of the farmers had a moderate level of SRI technology adoption, they should be motivated and encouraged through training and demonstrations by the government agencies to increase the extent of SRI technology adoption thereby reducing the technological gap. Farmers should be provided with quality inputs increased avenues of marketing and storage and required logistics for enhancing productivity and profitability at the farm level.

#### DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

- Adhikari, P., Sen, D., & Uphoff, N. (2010). System of rice intensification (SRI) as a resource-conserving methodology: Contributing to food security in an era of climate change. (Resource conserving technology vis-a-vis food security). *SATSA Mukhaptra Annual Technical Issue*, 14, 26-44.
- Dahiru, T. M. (2018). System of rice intensification: A review. *International Innovations in Agriculture and Bio-Research*, 6(2), 27-38.
- Debberma, B., Ram, D., Singh, M. K., & Deepa Devi, M. (2018). Extent of adoption of system of rice intensification (SRI) technology by the farmers of Tripura. *International Journal of Current Microbiology and Applied Sciences*, 7(4), 1853-1861.
- Devi, K. S., & Ponnarasi, T. (2009). An economic analysis of modern rice production technology and its adoption behaviour in Tamil Nadu. *Agricultural Economics Research Review*, 22, 341-347.
- Johnson, B., & Vijayaragavan, K. (2011). Diffusion of system of rice intensification (SRI) across Tamil Nadu and Andhra Pradesh in India. *Indian Research Journal of Extension Education*, 11(3).
- Kacharo, K. D. (2007). Agricultural information networks of farm women and role in agricultural extension. (Master's thesis). Department of Rural Development and Agricultural Extension, School of Graduate Studies, Himalaya University.
- Karki, S. (2010). System of rice intensification: An analysis of adoption and potential environmental benefits. (Doctoral dissertation). Department of International Environment and Development Studies, NORAGRIC Norwegian University of Life Sciences, 72-79.
- Kumar, G. A., Sailaja, V., Satyagopal, K., & Prasad, M. (2014). Evaluation of profile characteristics of SRI cultivation farmers in relation to their extent of adoption of technologies. *Journal of Current Biotica*, 8(1), 36-41.



- Kumar, M. R., Kumari, S., Rao, L. V. S., Latha, P. C., Prasad, M. S., Prasad, A. S. R., Goud, V. V., Raman, P. M., Shekar, N. S., Singh, S. P., & Viraktamath, B. C. (2007). Research experiences on system of rice intensification and future directions. *Journal of Rice Research*, 2(2), 61-71.
- Kumar, M. R., Surekha, K., Prasad, S. M., Prasad, R. A., Rao, L. S. V., Babu, V. R., Gopalakrishnan, S., Goud, V. V., Singh, S. P., & Viraktamath, B. C. (2010). Status of research on system of rice intensification (SRI) – Directorate of Rice Researcher's experiences and future directions. In *National Seminar on System of Rice Intensification (SRI)*, NABARD, H.Q., Mumbai.
- Kumari, S., & Prakash, S. (2020). Study on adoption of climate-smart system of wheat intensification (SWI) technology among the farmers of Bihar. *International J. Chem. Stud*, 8(1), 1289-1292.
- Meshram, V., Chovitkar, N., Paigwar, V., & Dhuware, S. K. (2012). Factors affecting the SRI system of paddy cultivation in Balaghat District of Madhya Pradesh. *Indian Research Journal of Extension Education*, 1, 202-204.
- Prasad, S. C. (2006). System of rice intensification in India: Innovation history and institutional challenges. *WFICRISAT Dialogue on Water, Food and Environment*, Patancheru, Hyderabad.
- Ray, P., & Raj, R. K. (2014). Extent of adoption of practices under system of rice intensification in Odisha. *International Journal of Rice*, 51(1), 81-85.
- Singh, B. (2003). Adoption behaviour of farmers in arid zone of Rajasthan. *Journal of Arid Legumes*, 11, 46-49.
- Singh, B. (2004). Adoption of Gaur technology in arid zone of Rajasthan. *Journal of Arid Legumes*, 1(2), 122-124.
- Singh, P. K., & Varshney, J. G. (2010). Adoption level and constraints in rice production technology. *Plant Protection*, 64, 53-00.
- Singha, A. K., & Baruah, M. J. (2011). Farmers' adoption behaviour in rice technology: an analysis of adoption behaviour of farmers in rice technology under different farming systems in Assam.
- Singha, A. K., & Baruah, M. J. (2012). Adoption behavior of dairy innovations by small farmers under different farming systems in Assam. *Indian Res. J. Ext. Edu*, 12(3), 60-64.
- Thatchinamoorthy, C., & Rexlin, S. (2014). A study on the profile of system of rice intensification (SRI) paddy growers in Tirunelveli District of Tamil Nadu. *International Journal of Current Research*, 6(4), 6064-6066.

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