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TECHNOLOGY ADOPTION OF FARMERS REGARDING SYSTEM OF RICE INTENSIFICATION (SRI) METHOD IN PURI DISTRICT OF ODISHA, INDIA

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Abstract

The study was carried out in Puri district of Odisha, India during 2014-15. A sample of farmers cultivating rice using the System of Rice Intensification (SRI) method involving 110 was selected on a multistage random sampling technique to select from the study area. The study reveals that farmers prefer long duration seed varieties (2.51), using FYM in the cropping land (1.80), covering seed with well decomposed FYM in nursery (2.02), well puddling and leveling the land (2.24), not removing seeds from plant during transplanting (1.75), smearing 4-5 tonnes of FYM/Compost per acre land (2.45), maintaining water at soil saturation (1.85) and uprooting weeds manually near to plant (1.80). This indicates that majority of the farmers were having medium level of adoption due to knowledge and aware of high production in SRI Technology as compare to traditional cultivation practices.

Key words: Adoption, Discontinuance, Farmer, Rejection, Rice, SRI.

Introduction

Rice is the primary source of nutrition for more than half of the world's population (Thakur et al. 2011). In 1983, Father Henri de Laulanie introduced the System of Rice Intensification (SRI) to Madagascar for the first time. He discovered it after late rains forced him and his students to transplant 15-day old plants that tillered and performed well after being transplanted early (Bouman, 2012).This technique for development has two fundamental credits, one, and planting of 8-12-day old seedling at 25×25 cm (nonetheless, the space between the seedlings relies upon the temperature of the zone) and second, utilizing diminished water (Laulanie, 2011). The wide dispersing between the 2 plants gives better space, air and daylight to the plants, assisting the roots with becoming solid and assimilate more supplements,

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which brings about expanded turners, longer panicles and expanded grain and expanded grain weight. WWF-ICRISAT (2006) report on SRI brings up that this strategy for paddy development requires the transplantation of seedlings when it's in two leaf stage, which assists the seedling with developing steadily and create more turners. Likewise, relocating of rice seedlings before they're 15 days' old limits the transfer stun, prompting better development of the plant (Adhikari et al. 2010).The fields are kept un-flooded during the amount of vegetative development, the soil must only be damp, and any excess water is drained off using this method. The roots keep aerated and develop healthy with the addition of a little water every now and then. During the reproductive phase, rice fields are flooded with 1-3 cm of water once flowering begins (Uphoff, 1999).

Puri District is a Coastal District on the eastern piece of Odisha, India. Covering a area of 3051 sq. km., the District might be separated into two divergent normal divisions-the Littoral plot and the Level alluvial parcel. It is additionally situated at 190 28' N Latitude 260 35' N, 840 29' E. Longitude 860 25' E. Its height is adrift level. Paddy, green gram, dark gram, kulthi and groundnut are a portion of the significant yields filled in the District. Being in nearness to the Bay of Bengal, this District has heat and humidity.

The SRI technique is very information serious and requires cautious examination and ceaseless experimentation to uncover out the most proficient blend of works on coordinating with the rice plant along the developing climate, like shifting the dividing between plants, seedling age, planting profundity of the seedlings, timing, and strategies for water system and seepage, just as strategies for weeding, and so on in the current setting of horticultural situation of the state.Rice cultivation using the SRI approach provides a greater potential for bridging Odisha's economic divide. The transfer of technology to investigate the production potentiality of (SRI) rice is the most essential part of its farming. It's also vital to persuade farmers to adopt and use technology in order to boost farm income.Because rice is the country's main crop. The growing population need increased food production. Along with ongoing crop production without maintaining soil health and natural resources, the area under rice is gradually shrinking over the year, distributing our ecosystem. As a result, a survey was conducted to determine farmers' attitudes about SRI technology adoption.

Materials and Methods

Location of the study

The research was carried out in the Puri area of Odisha, India, during the 2014-15 academic year. The state of Odisha is divided into 30 districts, with Puri being chosen because rice yield is high and the majority of rice land is under guaranteed irrigation. Only Nimapara block was purposefully chosen out of a total of 11 blocks since it has the highest number of farmers using SRI technology in the area. With the support of the Department of Agriculture of Odisha, a list of villages where SRI technique was more common in the block was compiled for this study.Following that, four villages were chosen for this study (Kuarpur, Durgapur, Kashia Sasan, and Dandipur) based on their biggest area under SRI technology. The four villages for the study were chosen in this manner.

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Method of data collection

The respondents were chosen from the Nimapara block using a proportionate random sampling process. This study used an ex post facto research design. The information was gathered using a well-structured and pre-tested interview schedule.

Analysis

Descriptive statistics, such as percentage, cumulative frequency, mean, and rank order, were used to analyse the data.

Percentage - In descriptive analysis, percentages were utilized to make an easy comparison between two replies. The frequency of a particular cell was multiplied by 100 and divided by the total number of respondents in the category to which cell they belonged to get the percentage (Blair and Burton, 1987).

$$\text{Percentage}=\frac{No.of respondents}{Totalno.of respondent}\times 100$$

Mean score - It is also simple comparison which was calculated by using the formula (Gibbons and Buunk, 1999).

$$MS=\frac{\sum fx}{N}$$

Where, M.S. =mean score

$\sum fx =$ Sum of total score obtained by the individual

N = total no. Of items / respondents

Rank order - On the basis of mean score rank order was made the item securing highest mean score was given first rank and then next highest was given second rank so on (Guttman, 1974).

Result

Adoption is the process of an individual fully utilizing technologies. The adoption process is a mental journey that takes a person from first hearing about an innovation to final adoption (Rogers, 1995).The primary purpose of extension functionaries is not only to transfer improved farm technologies to the farming community but also to motivate the farmers to adopt the technologies in order to enhance productivity. The important technologies involved in SRI method of rice cultivation were put before the farmers for their recognition on the behavior of adoption, or rejection, or discontinuance. The results are discussed below

Selection of Seed

From the table 1.it was observed that 29% of farmers adopt cultivation of rice with improved varieties, 47% discontinued and 23% people don't use improved varieties. The duration of crops used by farmer's were83.6% for 150 days and 120days duration crops were used by 38.2% of farmers.

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Preparation of Nursery Bed

From the table 3, it can be observed that the adoption of the nursery bed preparation is not much followed by the farmers, where selecting 40 sqmt of area is adopted by 34.5% of farmers, 23.6% discontinued and here 41.8% farmers rejected the technology. Adoption of bed size of 1x10m followed by 38.2% of people, 23.6% discontinued and 38.2% people rejected the technology. Preparation of raised seed bed is adopted by half of the farmers and half of farmers reject it. 60% of the farmers follow the mixing soil with FYM in equal amount on the bed and very few people 16.4% reject this technology. Providing drainage channel on all sides is adopted by farmers in 58.2%, 18.2% discontinued and 23.6% farmers rejected.

Nursery Bed Raising

From the table 3.it was observed that 2kg of seed and mixing seeds of with salt solution was adopted 5.5% by the farmers. While the adoption of sowing sprouted seeds was adopted by 36.4% farmers, 18.2% discontinued and 45.5% farmers rejected this technique. Farmers used 58.2 percent to broadcast sprouted seeds and 67.3 percent to coat seeds with FYM, respectively.

Land Preparation

From the table 4. It was observed that the adoption of preparing well leveled land with proper drainage and good puddling and levelling was by large farmers i.e. 69.1% and 74.5% respectively. Farmers adopting technique of making channel in 2m distance were 41.8% adopt, 34.5% discontinue and 23.6% reject it. Marking the field at 25x25cm distance was not adopted by farmers in large scale where 20% people adopted, 49.1% farmers discontinued and 30.9% farmers rejected it. Not keeping standing water during transplanting was adopted by 58.2%, while 23.6% discontinued and 18.2% farmers rejected the technology.

Transplanting

From the table 5.it was observed that the adoption of transplanting 8-12 days old seedling was by 54.5% farmers, discontinued by 32.7% and rejected by 12.7% of farmers. Farmers who adopted putting seedlings with a thin metal sheet of 30x30 cm were 27.3%, discontinued by 41.8% and rejected were 30.9%. Transplanting 1 seedling per hill, this method was adopted by 43.6% of farmers, discontinued were 27.3% and rejected were 29.1%. 52.7 percent of plants were shifted immediately after being uprooted from the nursery, 29.1 percent were halted, and 18.2 percent were rejected. Farmers adopted 58.2 percent of the time not removing seeds from the plant during transplanting, ceased 36.4 percent, and rejected 5.5 percent of the time.

Fertilizer Management

From the table 6.it was observed that the adoption of put on 4-5 tons FYM/compost per acre was by 81.8% farmers, discontinued by 14.5% and rejected by 3.6%

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farmers. Adoption of applying before ploughing and incorporating was by 74.5%, discontinued by 21.8% and rejected by 3.6% farmers. Green manuring/brown manuring adoption was by 7.3% farmers, discontinued by 56.4% and rejected by 36.5% farmers. Adoption of using vermin-compost was by 1.8%only, while discontinued by 25.5% and rejected by 72.7% farmers. The adoption of applying 60:30:20 kg NPK was by 50.9%, discontinued by 25.5% and rejected by23.6% farmers. The farmers who adopted applying nitrogen in 3 doses were 52.7%, farmers who discontinued were 36.4% and rejected were 10.9%. Applying potash in 3 doses were adopted by 61.8%, discontinued by 32.7% and rejected by 5.5% farmers.

Water Management

From the table 7.it was observed that maintaining water at soil saturation was adopted by 61.8% of farmers; farmers who discontinued were 36.4% and rejected were 1.8% of the farmers. Technology to provide drainage channel to avoid submergence was adopted by 47.3%, discontinued by 41.85% and rejectedby 10.9%. Alternate drying and wetting wasadopted by 16.4%, discontinued by 60% and rejected by 23.6% farmers. Technology of light irrigation during hairline cracks was adopted by 50.9%, discontinued by 38.2% and rejected by 38.2% farmers. Keeping 2-3 cm standing water during flowering to maturity was adopted by 50.0%, discontinued by 36.45 and rejected by 12.7%. Draining water 20 days after flowering method was adopted by 40% of the farmers, while discontinued by 47.3% and rejected by12.7% farmers.

Weed Management

From the table 8.it was observed that the farmers adopting irrigating field before 1 day of weeding were 43.6%, discontinue were 45.5% and rejected were 10.9% farmers. Adoption for using cono/mandwaweeder for weeding were 9.1%, discontinue were 27.3% and rejected were 63.6% farmers. Technology of using incorporating weeds into the soil was adopted by 10.9% of farmers, discontinued by 36.4% and rejected by 52.7% farmers. The method of 4 weeding at 10 days was adopted by 29.1% of farmers, discontinued by 32.7% and rejected by 38.2% farmers. An adoption of uprooting weeds manually near to the plant was by 60%, discontinued by 23.6% and rejected by 16.4% farmers.

Discussion

Selection of Seed

Most of the farmers cultivating rice discontinued cultivating improved varieties because they liked the local varieties of the rice. 150 days duration rice varieties were mostly adopted by the farmers in the sample area. Selection of seeds even though hybrids seems to fair well when compared to other cultivars (Adhikari*et al.* 2010).

Preparation of Nursery Bed

Most of the farmers adopted application of FYM mixed with equal amount of sand in the nursery bed and also provided channels for drainage on all sides. Preparation of raised nursery bed were adopted but several farmers rejected because they didn’t

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have adequate knowledge about preparing raised beds and putting nursery beds in 1m width across the nursery. Most farmers rejected recommended spacing for nursery bed as the farmers in the study area used more seed per acre from recommended dose.

Nursery Bed Raising

Covering seed of rice with well decomposed FYM in nursery bed was adopted by most of the farmers in the sample area as the technique is same for all kinds of rice production; it helps in better germination of rice. Broadcasting the sprouted seed on the seedbed was also adopted by higher respondents in sample area as for nursery broadcasting is only followed. Sowing of sprouted seed was rejected by some farmers as they didn't have better training on production technique. Most of the farmers in the study area didn't adopt use of improved rice variety as they were stuck with their traditional varieties of paddy which were better liked by the farmers; therefore the selected seed amount for rice per acreage was also different from the recommended doses of seed.

Land Preparation

Preparation of good puddling and leveling was adopted by majority of the respondents in the sample area as there were favorable climatic condition with monsoon during the sowing time and farmers prepare puddle and level in proper manner before transplanting the seeds in crop field. Proper drainage was also adopted by higher number of farmers as it was necessary for avoiding higher level of standing water in the rice field. Marking at 25cmX25cm was least adopted by the farmers as the farmers didn't follow proper spacing in the study area, most farmers followed traditional planting technique as they knew. Not keeping standing water in the field during transplanting was followed by higher proportion of farmers in the area as it helped farmers keep the transplants in upright condition and not deteriorate after transplanting.

Transplanting

The majority of the farmers in the study area used the age-old approach of not removing seeds from the plant before transplanting. The majority of farmers chose to transplant seedlings that were 8-12 days old because the period of transplanting was significantly more favorable. Transplanting single seedling per hill was not adopted by some farmers as they feared of not well establishment of seedlings and planted more during transplanting. Putting the seedlings in a thin metal sheet was not adopted by most of the farmers as the farmers were not aware about the technique and they needed training for enhancing their knowledge.

Fertilizer Management

Most of the farmers in the study area adopted application of FYM and compost in proper manner as the farmers have been following the age old technique of application of these inputs. The application of NPK fertilizers were also adopted in the sample area as the farmers had better knowledge about the application of chemical fertilizers. The reason fertilizer recommendation found to give better

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response (Singh, 2004). Only few farmers adopted and most farmers didn't adopt green manuring and vermicomposting in the sample area, the farmers were not aware about these inputs in rice crop field.

Water Management

Alternate drying and wetting and light irrigation during hairline cracks were not adopted by majority of the farmers as the farmers were lacking knowledge in those parts of cultivation. Other techniques of water management were adopted by majority of the farmers. With the adoption of SRI farming technique by farmers, personal, psychological, and communication characteristics were shown to be positive and significant of personal, psychological, and communication characteristics (Kumar et al. 2014).

Weed Management

Manual uprooting of weeds near plant was adopted by majority of the farmers in the sample area as it was the way most farmers took out weed from the crop field in the area. Irrigating the crop field one day before weeding was adopted by some farmers but higher number of farmers didn't adopt the technique because of presence of moisture or some standing water in the crop field during weeding. Weed managementgives the benefits of cultivating a green manures crop (Adhikari*et al.* 2010; Prusty*et al.* 2020).

Conclusion

According to the findings, the majority of farmers have a medium level of adoption of SRI Technology due to knowledge and awareness of higher yields in SRI Technology compared to traditional agriculture approaches. The adoption of SRI farming technology methods by rice growers in the Puri District of Odisha, India, was found to be highly influenced by education and mass media exposure.

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Table 1. Adoption behavior of farmers towards selection of seed (N=110)

SL. NO.	Statements	Adoption		Discontinuance		Rejection		Mean Adoption	Rank
		F	%	F	%	F	%		
1	Improved variety of seed	32	29.1	52	47.3	26	23.6	0.87	3
2	Medium lowlands and low lands required varieties of 150 days duration	92	83.6	18	16.4	00	00	2.51	1
3	Medium uplands required varieties of 120 days duration	42	38.2	50	45.5	18	16.4	1.15	2

Table 2. Adoption behavior of farmers towards preparation of nursery bed (N=110)

SL. NO.	Statements	Adoption		Discontinuance		Rejection		Mean Adoption	Rank
		F	%	F	%	F	%		
1	Selecting 40 sqmt. Area for 1acre crop	38	34.5	26	23.6	46	41.8	1.04	5
2	Bed size 1x10 metre	42	38.2	26	23.6	42	38.2	1.15	4
3	Preparing raised bed of 8-10 cm height	44	40	24	21.8	42	38.2	1.20	3
4	Putting well mixed soil and FYM of equal amount on the bed	66	60	26	23.6	18	16.4	1.80	1
5	Provide drainage channels on all sides	64	58.2	20	18.2	26	23.6	1.75	2

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Table 3. Adoption behavior of farmers towards raising nursery bed (N=110)

SL. NO.	Statements	Adoption		Discontinuance		Rejection		Mean Adoption	Rank
		F	%	F	%	F	%		
1	Using 2 kg seeds per acre	6	5.5	46	41.8	58	52.7	0.17	4
2	Selecting good quality seeds with salt solution	6	5.5	36	32.7	68	61.8	0.17	4
3	Sowing only sprouting seeds	40	36.4	20	18.2	50	45.5	1.09	3
4	Broadcasting the sprouted seeds on the seed bed	64	58.2	24	21.8	22	20	1.75	2
5	Covering seeds with well decomposed FYM	74	67.3	28	25.5	8	7.3	2.02	1

Table 4. Adoption behavior of farmers towards land preparation (N=110)

SL. NO.	Statements	Adoption		Discontinuance		Rejection		Mean Adoption	Rank
		F	%	F	%	F	%		
1	Preparing well levelled filed with well drainage	76	69.1	16	14.5	18	16.4	2.07	2
2	Good puddling and levelling	82	74.5	10	9.1	18	16.4	2.24	1
3	Making channel after 2 metre distance	46	41.8	38	34.5	26	23.6	1.25	4
4	Marking at 25x25 cm distance	22	20	54	49.1	34	30.9	0.6	5
5	Not keeping standing water during transplanting	64	58.2	26	23.6	20	18.2	1.75	3

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Table 5. Adoption behavior of farmers towards transplanting (N=110)

SL. NO.	Statements	Adoption		Discontinuance		Rejection		Mean Adoption	Rank
		F	%	F	%	F	%		
1	Transplanting 8-12 days old seedlings	60	54.5	36	32.7	14	12.7	1.64	2
2	Putting seedlings with a thin metal sheet of 30x30 cm	30	27.3	46	41.8	34	30.9	0.82	6
3	Transplanting single seedling per hill	48	43.6	30	27.3	32	29.1	1.31	5
4	Transplanting immediately after uprooting from nursery	58	52.7	32	29.1	20	18.2	1.58	3
5	Not removing seeds from the plant while transplanting	64	58.2	40	36.4	6	5.5	1.75	1
6	Not washing the seedlings after uprooting	54	49.1	50	45.5	6	5.5	1.47	4

Table 6. Adoption behavior of farmers towards fertilizer management (N=110)

SL. NO.	Statements	Adoption		Discontinuance		Rejection		Mean Adoption	Rank
		F	%	F	%	F	%		
1	Applying 4-5 tonnes FYM/compost per acre	90	81.8	16	14.5	4	3.6	2.45	1
2	Applying before ploughing and incorporating	82	74.5	24	21.8	4	3.6	2.24	2
3	Green manuring/brown manuring	8	7.3	62	56.4	40	36.5	0.22	6
4	Using vermin-compost	2	1.8	28	25.5	80	72.7	0.05	7
5	Applying 60:30:20 kg NPK	56	50.9	28	25.5	26	23.6	1.53	5
6	Applying nitrogen in 3 doses	58	52.7	40	36.4	12	10.9	1.58	4
7	Applying potash in 3 doses	68	61.8	36	32.7	6	5.5	1.85	3

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Table 7. Adoption behavior of farmers towards water management (N=110)

SL. NO.	Statements	Adoption		Discontinuance		Rejection		Mean Adoption	Rank
		F	%	F	%	F	%		
1	Maintaining water at soil saturation	68	61.8	40	36.4	2	1.8	1.85	1
2	Provide drainage channel to avoid submergence	52	47.3	46	41.8	12	10.9	1.42	3
3	Alternate drying and wetting	18	16.4	66	60	26	23.6	0.49	6
4	Light irrigation during hairline cracks	26	23.6	42	38.2	42	38.2	0.71	5
5	Keeping 2-3 cm standing water during flowering to maturity	56	50.9	40	36.4	14	12.7	1.53	2
6	Draining water 20 days after flowering	44	40	52	47.3	14	12.7	1.2	4

Table 8. Adoption behavior of farmers towards weed management (N=110)

SL. NO.	Statements	Adoption		Discontinuance		Rejection		Mean Adoption	Rank
		F	%	F	%	F	%		
1	Irrigating filed before 1 day of weeding	48	43.6	50	45.5	12	10.9	1.31	2
2	Using cono/mandwaweeder for weeding	10	9.1	30	27.3	70	63.6	0.27	5
3	Incorporating weeds into the soil	12	10.9	40	36.4	58	52.7	0.33	4
4	4 weeding at 10 days interval	32	29.1	36	32.7	42	38.2	0.87	3
5	Uprooting weeds manually near to the plant	66	60	26	23.6	18	16.4	1.8	1