Why Do Farmers Adopt or Dis-adopt ? SRI–A Short Report from the Field

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The System of Rice Intensification has made its presence felt in the Indian agriculture scenario, by its fast speed and the promise to " grow more with less". Yet there has also been a lot and reports of disadoption. This preliminary report of a research lays out a number of reasons, predominantly rainfall failure related for farmer drop-outs.

Introduction

In India, rice is grown on 44 million ha of land, producing approximately 90 million tonnes of rice, with an average productivity of 2 tonnes per ha. Rice occupies 46 per cent of the total area under cereal cultivation and contributes 47 per cent of the total food production. The annual production of more than 90 million tonnes is the highest contribution of a single crop to the total food grain production in the country. At the same time, India is the second most populous country in the world, with the population crossing over 1.2 billion in 2011, and the demand for rice is growing every year. It is estimated that in 2025 AD, the requirement will cross 140 million tonnes, to feed the increasing population. To sustain present food self-sufficiency needs and to meet future food requirements, India has to increase its production of rice by at least 3 per cent per annum. Rice, unfortunately, requires large quantities of water for cultivation and 1 kg of rice uses an astronomical 3,000 to 5,000 litres of water, depending upon the variety being cultivated. Owing to increasing water scarcity, some parts of India are shifting towards less water intensive crops. But is this shift desirable in the context of the growing food insecurity among small and marginal farmers, particularly in less endowed areas?

Rice is the most important staple food for a majority of the population; therefore, it warrants an alternative method of cultivation—one that utilizes less water and achieves higher productivity. Empirical evidence clearly indicates that cultivation of rice through the System of Rice Intensification (SRI) fulfills the dual objective of increasing the yield of rice two to three fold, as compared to the current crop yield level, and also conserves water. Having observed the merits of SRI, farmers worldwide have adopted the practices and have reaped its benefits. At present, more than a million farmers in India have adopted SRI. This agro-ecological innovation has the intrinsic quality to produce more with fewer inputs of seeds, water, fertilizer, pesticides and, often, labour. These advantages have attracted many farmers.

SRI is a knowledge-intensive methodology and, for that reason, an intesive extension mechanism to deliver this new technology to the small farmers. A few state governments and civil society organizations (CSOs) have been playing a proactive role in disseminating information about SRI among farmers. Many state governments and civil society organisation have been achive in the promotion and implementation of SRI. There is now a need for an objective assessment of the progress made and the processes followed, in order to facilitate the spread of SRI throughout the country.

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Traditionally known to be agriculturally less developed, Bihar has now very active in the adoption of SRI methodology. The government has introduced several pro-poor and small farmer-oriented initiatives and put a number of multi-pronged policy strategies in place, which could herald a change in the food production scenario of the state. Similarly, in order to come out of the low-yield trap, Odisha has also implemented several initiatives for increasing rice production. Interestingly, both the states have some similarities in this regard: both face abject poverty and both are classified as having a rain-fed farming system with low productivity levels of the most important crop—rice. It is felt that an understanding and comparison of the status and process of rice cultivation practices, including SRI, will be useful. The primary goal of a study of this kind will lead to an understanding of the process of adoption and dis-adoption of SRI by various farm sizes, particularly small farmers.

OBJECTIVES OF THE STUDY

a. To examine the status of adoption of SRI and to study the causes and effects of the dis-adoption behaviour. A comparison of the performance of SRI in rain-fed and irrigated areas.

b. To assess the impact of SRI on household food security in rain-fed and irrigated areas.

c. To analyze the farmer's perception of the sustainability of the practice and derive policy imperatives through the analysis.

METHODOLOGY

In order to capture the changes in SRI adoption pattern across years, a longitudinal study is planned for three seasons starting 2011–12. The study aims to understand the adoption process over the seasons, and hence a panel data will be generated, accounting for both a cross-section and a time series data. The socio-economic dynamics of the adoption of the SRI process will be studied with the help of carefully designed village surveys with an interview schedule. A total of 1,500 farmers will be surveyed across seven districts from the less developed states of India, which are actively engaged in practising SRI. One of the criteria for the selection of sample farmers is the presence of prominent NGOs. Sample farmers, representing the irrigated and the rain-fed ecosystems, will be selected to enable a comparison of the two systems. This is an interim report from the first phase of the study carried out in the kharif season of 2012-13.

For this phase two representative districts were selected: one from Bihar and the other from Odisha. Blocks were selected based on the intensity of adoption (number of farmers adopting SRI in a particular block or village). As many as 28 villages were selected from Gaya and Keonjhar, using a stratified, random sampling procedure. Villages were stratified, based on the number of adopters of SRI and, hence, within the strata, the farmers were selected randomly. For the purpose of

comparison, a few non-adopters as well as farmers from non-SRI villages were selected . Thus, the sample comprised a total of 210 farmers as shown in Table 1. This sample of 210 farmers comprised 110 farmers from Gaya in Bihar and 100 from Keonjhar in Odisha. A dedicated team of surveyors were located at the selected districts and were trained for data collection. A well-structured questionnaire was designed and pre-tested for the study. The collected data has been compiled and cleaned for tabular analysis and other statistical tools have been used for report writing. The procedure for the selection of the village and farmer sample was as follows.

The older SRI farmers have been practising SRI for four to five years whereas non-SRI farmers in the selected SRI village are those who did not adopt SRI principles or tried these out and abandoned the efforts.

SAMPLE SELECTION

In Keonjhar, PRADAN is engaged in the promotion of SRI in three blocks—Banspal, Sadar and Patna. Urumunda, Lanjipada, Bayakumutia, Tentulikhuti, Baliapasi, Padmakeshrapur, Bardapal, Mahadeijoda, Hatikucha, Anusuan, Rengalbeda and Jharbeda villages were selected for the purpose of the study. Similarly, the villages of Tetariya, Bumer, Belharia, Seway, Chinuk Bigha, Mishribigha, Kamaldhara, Barkibigha, Mirljak, Kumawan, Chanda, Kauwar, Mudiyal, Ghantadih and Shekhwara were selected from Gaya district, Bihar. Because the adoption behavior as well as the adopters change over time, two types of sample farmers were identified—a few new adopters of SRI and a few others who have been practising this technology for a few years. The older SRI farmers have been practising SRI for four to five years whereas the non-SRI farmers in the selected SRI villages were those who did not adopt SRI or had tried out and then abandoned the efforts. A couple of farmers were also selected from a non-SRI village (Table 1). Simple statistical tools of tables, graphs and ranks have been used to analyze the survey data.

FINDINGS

Gaya

Gaya is the second largest district of Bihar, with an area of around 4,87,607 sq km. It is divided into four sub-divisions, 24 blocks, 332 *panchayats* and 2,889 villages. As per the 2011 Census, the total population of Gaya is 3,473,428. The Bihar Rural Livelihood Programme (a World Bank-funded project) and PRADAN have organized interventions in Gaya to promote SRI through the formation of Self Help Groups, or SHGs (an informal body of around 15–20 women involved in savings and credit activity). The average paddy yield of small and marginal households in SHGs farmer ranges from 0.8 to 1.02 tonnes per ha, which is just enough to meet four to five months of the total requirement of rice for a household. The project, introduced SRI in 2007 with 128 smallholders on 30 ha of land. with PRADAN as the resource open the average yield increased to nearly 10 tonnes per ha, which was phenomenally higher than the existing productivity. Based on the success of the pilot, SRI promotion was scaled up in the following three years with 5,146,8,367 and 19,911 smallholders (colloquium on SCI).

KEONJHAR

Keonjhar is a land-locked district, with an area of 8,240 sq km. As per the 2011 Census of India, the total population of the district is 15,61,990. The district is divided into two widely dissimilar tracts—the lower Keonjhar and the upper Keonjhar. The former is a region of valleys and lowlands whereas the latter includes mountainous highlands with a general slope from North to South. Rice is the

subsistence crop of the district. Agriculture is the backbone of the economy. People living in rural areas are mostly marginal and small farmers, with small landholdings that have poor irrigation facilities. Villagers have an extremely low income. More than 77 per cent of the total population of Keonjhar is below the poverty line (BPL). SRI was initiated in Keonjhar by PRADAN in 2007. There are now more than 5,000 SRI farmers in Keonjhar, including those promoted by the Department of Agriculture.

PROFILE OF SAMPLE FARMERS

The average age of the selected farmers in Gaya is high and the family size is large as well (both in comparison with Keonjhar). Most of the farmers in Gaya are small and marginal. They are a highly vulnerable group, in terms of food security to SCs. It was also observed that a number of farmers in Gaya are members of SHGs and the Farmers Club (FC). (Table 1)

Table 1: Profile of the Sample Districts in Bihar and Orissa

Profile of the Selected Farmers			
Particulars	**Unit**	**Gaya**	**Keonjhar**
Average age	Years	41.4	37.5
Average family size	Nos.	9.14	5.54
Average own land holding	Acres	1.37	1.95
Average leased landholding	Acres	0.05	0.20
Farmers in the SC category	%	12.7	8
Farmers in the ST category	%	25.5	60
Farmers in the OBC category	%	49	31
Farmers in the General category	%.	13	1
BPL farmers	%	52	84
Above poverty line farmers	%	48	13
SHG members	%	31	93
Common Interest Group (CIG) members	%	2	0
FC members	%	29	13

In Keonjhar, the average family size is relatively smaller and the average age of the farmers is also lower. The landholdings of the farmers in Keonjhar are small and marginal. A majority of the farmers are tribal. Dependency upon rainfall makes these farmers extremely vulnerable and their livelihoods highly insecure.

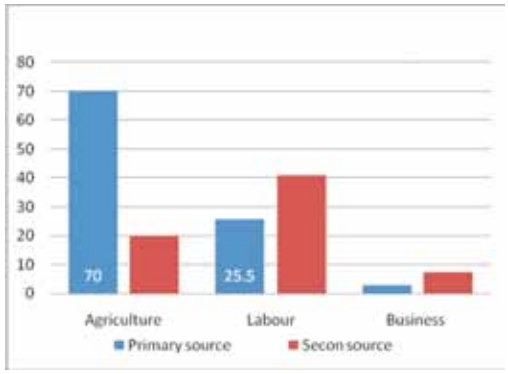

Figure 1: Sources of livelihood in Gaya

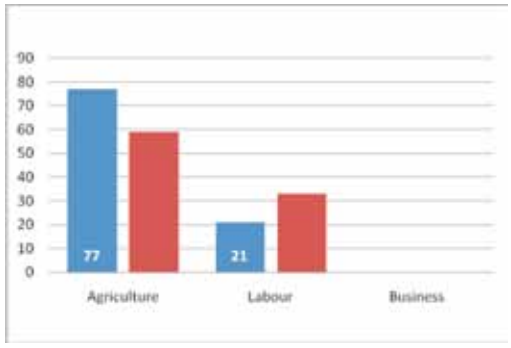

Figure 2: Sources of livelihood in Gaya

The survey shows that the primary source of income in both Gaya and Keonjhar is agriculture.

One finds a clear, inverse relationship between poverty (%) and productivity (%)—lower productivity leads to poverty. Agriculture in both these districts is very traditional. Recently, SRI has drawn the attention of the farmers and is increasingly being adopted by them. Since the practice is new in these villages, the adoption was observed to be slow but is gradually gaining ground.

PATTERN OF ADOPTION OF SRI

A large number of farmers have been showing interest in adopting SRI practices because they are convinced by the results/yield for those who have adopted it in these two districts. Most of the farmers have adopted SRI on their own land whereas some others are adopting SRI on leased land and land under share cropping as well. Based on the available data, from the sample village, it was found that, initially in Gaya, seven farmers started practising SRI in 2007 on 6.9 acres of land. Subsequently, the number of adopters increased to 15 farmers in 2008, and in 2009, the number of adopters further increased to 18 farmers, covering 16.41 acres of land; two farmers initiated SRI under share cropping.

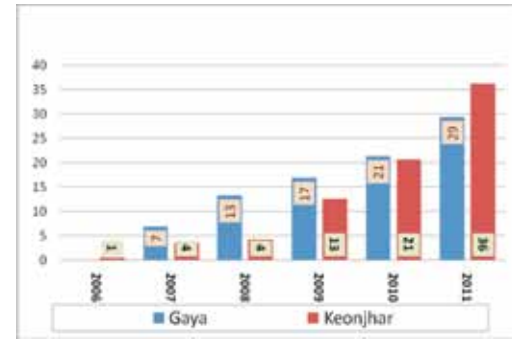

Figure 3: Adoption of SRI in Gaya and Keonjhar districts during 2006-2011

Table 2: Trends in the Pattern of Adoption of SRI under Various Tenancy Structures in Sample Villages

		Own Land		Leased land		Share Cropping		
Disttrict	**Year**	**Area (acres)**	**No. of Farmers**	**Area (acres)**	**No. of Farmers**	**Area (acres)**	**No. of Farmers**	**Total area**
Gaya	2007	6.9	7	0	0	0	0	6.9
	2008	12.93	15	0	0	0.37	1	13.3
	2009	16.41	18	0	0	0.48	2	16.89

		Own Land		Leased land		Share Cropping		
	2010	20.48	54	0	0	0.89	4	21.37
	2011	28.04	73	0.19	1	1.14	5	29.37
Keonjhar	2006	0.6	3	0	0	0	0	0.6
	2007	3.57	12	0	0	0	0	3.57
	2008	3.72	12	0.05	1	0.5	1	4.27
	2009	10.23	34	1.93	4	0.5	1	12.66
	2010	18.95	58	1.25	4	0.5	1	20.7
	2011	34.52	66	0.85	5	0.8	1	36.17

In 2010, there was a huge jump in the numbers of farmers (54 farmers and a coverage area of 20.48 acres) adopting SRI. The farmers practising SRI increased in shared cropping areas when four farmers initiated SRI on 0.89 acres of land. Seventy-three farmers initiated SRI on 28.04 acres of their own land; one farmer initiated SRI on 0.19 acres of leased land and five farmers adopted SRI on 1.14 acres of land, under the share-cropping pattern in 2011.

Similarly, SRI was initiated in Keonjhar in 2006 with three farmers. Between 2007 and 2008, there was a marginal increase in the number of farmers adopting SRI but 2009 witnessed a major increase in the numbers. This trend continued in 2010 and 2011 as well (Table 2).

INPUT USAGE PATTERN

The engagement of labour in conventional rice cultivation is more than in SRI. In Keonjhar district, on a per acre basis, 66 labour days were needed in conventional rice cultivation as compared to 40 days in the SRI method. However, for Gaya, the average labour engagement for conventional rice and for SRI remains the same—around 62 labour days. The nature of inter-culture operations is different in both the regions. The activity under inter-culture operations is weeding. In Gaya, the focus is on weeding but this is not very prevalent in Keonjhar.

Table 3: Average Labour Use in SRI

Use of Labour in the Conventional Method of Rice Cultivation and in SRI			
District	**Unit**	**Conventional Rice**	**SRI**
Keonjhar	Labour days per acre	66	40
Gaya	Labour days per acre	62	62

The inter-culture activities in are very important and the productivity of the crop depends upon the various inter-culture operations, and other management practices. The intermittent drying-wetting of the field makes it susceptible to weed growth; thus timely weeding operations are essential. Table 4 shows the practices and the intensity of engagement of various operations in both the districts. Not all the farmers engaged in STI method of cultivation follow all the principles of SRI till the end.

Table 4:- Inter-culture Operations and Other Management Practices in SRI

Input Usage Pattern		
	Gaya	**Keonjhar**
	% farmer	% farmer
Seed treatment	92.22	93.75
Marker for transplantation	98.89	82.5
First weeding	82.22	100
Second weeding	60.00	68.75
Third weeding	3.33	12.5

Seed treatment enhances the productivity of the crop (more than 92 per cent of the farmers used seed treatment); it protects plants from fungal and bacterial diseases. The use of markers during transplantation helps in maintaining proper spacing between plants. This reduces competition for soil nutrients and increases the productivity of the crop (over 80 per cent of the farmers of the sample followed this method). Weeding also increases productivity of the crop because it helps aerate the land. Later, the weeds are converted into biomass and provide valuable nutrition to the plants. The survey revealed that more than 92 per cent of the farmers from the sample treated their seeds but non-SRI farmers did not treat their seeds for the nursery. Along with this, almost all the farmers in Gaya used markers for transplantation and more than 82 per cent of the farmers conducted the first weeding, 60 per cent of the farmers conducted a second weeding and only three per cent of the farmers conducted the third weeding of the crop. In Keonjhar, around 93 per cent of the farmers treated their seeds before sowing, around 82 per cent of the farmers used markers for transplantation and almost all the farmers were engaged in the first weeding of their SRI crop. Little more than 65 per cent of the farmers conducted the second weeding and only 12 per cent of the farmers conducted the third weeding of the crop. Notably, the third weeding was not followed by most of the farmers. This could be because of the fact that after the second weeding, the plant density increases and when the leaf canopy increases, it becomes difficult to conduct weeding.

Table 5: Distribution of the Benefits of Enhanced Production through SRI (% of farmers)

	Percentage of Farmers Who Achieved Increased Production	
Range of increase in Production	**Gaya**	**Keonjhar**
0–50%	9.09	33.33
51–100%	40.91	42.86
101–150%	25.00	
151–200%	25.00	23.81

SRI is an unprecedented innovation that enables farmers to achieve 'more output with reduced inputs'. SRI makes it possible for crops to mobilize bio-physical benefits of natural resources

Evidence clearly proves that SRI increases productivity and production at the farm level. Table 5 shows that 50% of the farmers achieved more than 100% increase in production in Gaya and 66% in Keonjhar achieved increase of over 100%. By disaggregating the above data further, the study found that in Gaya, 40 per cent of the sample farmers achieved an increase in rice production in the range of 51–100 per cent and 25 per cent of the farmers had a production increase in the range of 101–150 to 151–200 percent each. In Keonjhar, around one-third of the farmers increased their rice production in the range of 0–50 percent; 42.86 percent of the farmers in the range of 51–100% and 23.81 percent of the farmers had an production increase in the range of 151–200 percent (Table 5). Any increase in paddy production directly affects the food security of small and marginal farmers. During the data collection process at both the places, the farmers said that (in discussions during the survey process) SRI had a positive impact on their families, in terms of food security.

Table 6: Addition to Food (Rice) Availability Due to SRI

Additional Availability of Home-grown Rice in Months		
	Gaya	**Keonjhar**
Months	Percentage	Percentage
0–3	9.62	5.48
3–6	28.85	10.96
7–9	25.96	9.59
10–12	35.58	73.97

The increase in productivity by adopting SRI has directly affected the food security of families. Some of the families that were under the pressure of food deficit for a good part of the year now have surplus production. They are even able to sell their produce in times of distress. In Gaya, 9.62 per cent of the farmers had additional food availability for a period of 0–3 additional months, 28.85 per cent of the farmers had an additional food availability for a period of 3–6 additional months, 25.96 per cent of the farmers had an additional food availability for a period of 7–9 additional months and 35.58 per cent of the farmers had an additional food availability for a period of 10–12 additional months (Table 7). In Keonjhar, 5.48 per cent of the farmers had additional food availability for a period of 0–3 additional months, 10.59 per cent of the farmers had an additional food availability for 3–6 additional months, 9.59 per cent of the farmers had an additional food availability for 7–9 additional months and a major portion of the population, that is, 73.97 per cent had an additional food availability for a period of 10–12 additional months (Table 6).

A pertinent question now being asked is how such a gain on return to cultivation is possible and what the implications are of this gain on input usages. According to the farmers, the savings they have made on seeds, fertilizers, irrigation as well as labour have been particularly attractive.

There is an apprehension that SRI requires more skilled labour for transplanting and weeding, in comparison to the traditional method. The field survey does not indicate this to be true. Studies in Andhra Pradesh have shown that on an average, the ratio of labour use between SRI and non-SRI practice is 0.76

The cost of various inputs is calculated based on an irrigation charge of Rs 300 per irrigation per ha, the wage rate @ Rs 80 per day and seeds as per the prevailing rate during the survey year. SRI management practice recommends alternate wetting and drying (AWD) system of irrigation. AWD is a water saving technology. In AWD, the field is not flooded with water; instead, the field is covered with a thin layer of moisture for a certain number of days. The field is allowed to be dry for a few days between water applications. The slight hairline cracks that appear help improve soil aeration. Under this method of cultivation, a single seedling is planted per hill and the hills are widely spaced. Therefore, the number of seedlings required for the planting unit area is reduced to a great extent compared to the traditional method. For instance, with 25 cm x 25 cm square planting, only 16 seedlings are needed to transplant 1 sq m of the field. This implies that only 5–7.5 kg of seeds are required to plant a rice field of 1 ha, as compared to the 60–80 kg required in the conventional method of cultivation. This is the first obvious benefit of the SRI management practises to farmers. Based on the number of seedlings, the required per unit area and 100 per cent seed germination, the seed requirements in SRI are a tenth of those in the conventional method.

Table 7: Savings on Various Inputs through SRI

Based on Farmers' Perceptions		
	Input Savings in Gaya	Input Savings in Keonjhar
	Savings Per Acre (Rs)	Savings Per acre (Rs)
Saving in Irrigation (Rs)	503.75	76.58
Saving in Labour (Rs)	2,098.74	2,916.04
Saving in Fertilizer (Rs)	80.80	555.10
Saving in seeds (Rs)	722.10	223.89
Total	3,405.39	3,771.61

Indicating that the total labour use is at least 24 per cent less in the SRI method as compared to the conventional method. In Tamil Nadu, however, labour use is almost at par in both the methods. During the research process in Gaya, it was observed that on an average, each farmer was able to save around Rs 2,000 in labour costs.

CHANGES IN OTHER COSTS

There are two types of costs associated with the cultivation of rice. One is the input cost (as mentioned earlier) for crop production and the other is the cost incurred after the harvesting of the crop. Because there are several ways of altering input usage in SRI as compared to the conventional method, the cost incurred by the farmers is bound to be different in the two practices (perception survey shown in Table 7). SRI increases both grain production as well as production of dry matter. The increased volumes also require increased handling costs . Post harvesting of a crop cycle comprises harvesting, transportation of the crop from the field to homes, grain separation, winnowing and packaging. After completing all these activities, the grain is ready either for sale or for household consumption.

The adoption of SRI at the farm level is determined by various factors such as an increase in the production, savings on inputs, reduction in chemical fertilizers and the use of vermi compost—all of which are an intrinsic part of SRI. The survey reveals that a large number of farmers expressed a keen interest in adopting SRI.

Table 8: Comparison of Savings in Labour in Various Operations in SRI and CMP

	SRI		Traditional	
Gaya	Per Family	Per acre (Rs)	Per family (Rs)	Per acre (Rs)
Harvesting	172.62	534.83	156.78	385.76
Transporting	102.29	316.92	96.89	238.40
Grain separation	246.73	764.45	90.27	222.12
Winnowing	125.97	390.30	88.67	218.19
Packaging	93.86	290.81	59.26	145.81
Keonjhar				
Harvesting	393.17	891.35	1605.40	897.72
Transporting	280.98	636.99	1180.00	659.84
Grain separation	215.61	488.80	654.60	366.05
Winnowing	138.54	314.07	464.50	259.74
Packaging	103.41	234.45	352.40	197.06

In Gaya, the post-harvest cost in SRI was much higher than in the traditional cropping system. The harvesting cost in SRI was Rs 543 whereas, in the traditional cropping system, it was only Rs 385 per acre. The transportation cost of the produce under SRI was Rs 316 as compared to Rs 238 per acre in the traditional method. The cost of grain separation in Gaya was Rs 764, more than twice the cost involved in the traditional cropping system. The cost of winnowing in the traditional system of crop cultivation was Rs 218, much lower than the cost of winnowing in SRI. And the cost of packaging in SRI is almost double the traditional system of rice cultivation.

SRI increases both grain production as well as production of dry matter. The increased volumes also require increased handling costs.

FACTORS AFFECTING THE ADOPTION OF SRI

The adoption of SRI at the farm level is determined by various factors such as an increase in the production, savings on inputs, reduction in chemical fertilizers and the use of vermi compost—all of which are an intrinsic part of SRI. The survey reveals that a large number of farmers expressed a keen interest in adopting SRI and went ahead and did so. Most of them are continuing with the new technique. What are the causal factors leading to the adoption of SRI among farmers? In Gaya, 28.09 per cent of the farmers thought that higher production was a major reason for adopting SRI, which is also important for food security at the household level. Another reason stated by 13.11 per cent of the farmers was the lesser labour input involved in this agro-ecological innovation (Table 9).

Table 9: Analysis of Opinion Survey and Farmer Interest Group Discussion

Farmers' Responses to the Reasons for Adopting SRI (%)		
Reasons	**Gaya (%)**	**Keonjhar (%)**
High production	28.09	28.80
Less labour	13.11	9.60
Less input cost	10.11	21.60
Less seed	26.14	12.00
Less fertilizer/compost	0.75	11.60
Less water	11.24	3.20
More tillers	5.24	2.40
More profit	2.62	
More land productivity	1.12	
Other		6.00

Around 10 per cent of the farmers said that the reduction of input costs was the reason for adopting SRI. Less requirement of seeds was also an important reason (26 per cent of the farmers), prompting the farmers to continue practising this method. In Gaya, 11.24 per cent of the farmers said that consumption of less water and 5.24 per cent of the farmers said that more tillers are the reasons for their adopting SRI (Table 9).

Similarly, in Keonjhar, the higher production is a dominant reason for adopting the SRI method, as expressed by 28.80 per cent of the farmers, whereas 9.60 per cent of the farmers said that the reason for adopting it was the reduced labour input whereas 21.60 per cent cited reduction in the overall input costs in comparison with the conventional method. Similarly, 11.60 per cent of the farmers said that this method of agriculture requires less fertilizer and compost as compared to the conventional method. Some farmers also responded that this method of agriculture leads to more effective tillers and thereby less chaffy grains (Table 9).

DIS-ADOPTION

The survey traces a small stint of dis-adoption for extraneous reasons, out of the control of the farmers.

One of the objectives of the study is to understand the dis-adoption of SRI (if any), at the farm level and the reasons associated it. The survey traces a small stint of dis-adoption for extraneous reasons, out of the control of the farmers. Around 12 per cent of the farmers in Gaya reported discontinuation of SRI. This happened because they were compelled to discontinue SRI due to a severe drought in the region for two consecutive years in 2008–09 and 2009–10. The study did not find any farmer in Gaya who dis-adopted SRI due to factors other than drought severity (Table 10).

Similarly, in Keonjhar, 11 farmers said that they had dis-adopted SRI in the region. Seven of these farmers discontinued SRI because of continuous scarcity of water. Two farmers were unable to continue with SRI due to sudden sickness and family problems. A few faced a combined problem of water and labour and, thus, dis-adopted SRI (Table11). Thirteen of the sample farmers reported several constraints for not adopting all the SRI components. The lack of skilled labour and handholding training were major constraints for more than 50 per cent of such farmers. Although the farmers understood the value of regular weeding and the use of cono-weeders, they were unable to do as prescribed due to the lack of availability of the implement. Some of the farmers faced difficulties doing a third cono-weeding after 50 days. The crop was fully established by then and because of the canopy development, the space between rows was reduced.

Table 10: Reasons for Dis-adoption of SRI amongst Farmers

Gaya	
Reasons	**Number of Respondents**
Water problem	13
Total	13
Keonjhar	
Reasons	**Number of Respondents**
Water problem	7
Sickness	2
Labour problem	1
Water problem and labour problem	1
Total	11

POLICY IMPERATIVES

SRI has shown enormous promise in the areas where it has been introduced. SRI practices are now available on a national scale to promote and accelerate community led agricultural growth while managing soil and water resources for securing sustainability. The aspect of food security is closely connected to enhancing the future capacity of rice production. SRI modifies how farmers manage the plants and exploit the genetic potentiality, but not the plants themselves. Most importantly, it mitigates the drawbacks associated with mono-cultures, agro-chemicals and climate change. This makes it a win-win proposition for rural households, the nation and the planet. Unfortunately, despite a well-published need for a participatory approach, to increase the agricultural production strategy, farmer-led innovations fail to attract the interest of the scientific establishment. Several questions are raised from time to time about the genetic possibility, the carrying capacity of soil, nutrient mining, input savings (seed, water and chemicals), along with the socio-economic issues. These are often unfounded. In science, innovations always attract doubts. Accumulated evidences respond to some of these questions, be it in the scientific or the socio-economic spheres. This study attempts to explore some on-farm evidence on the dis-adoption hypothesis and has conducted village-level, structured farm surveys.

SRI has shown enormous promise in the areas where it has been introduced. It is perhaps one of the best options that has been developed for a farmer—an innovation for the 21st century.

The study could not trace any significant voluntary dis-adoption of SRI. The sample farmers have adopted SRI and have been practising the technology of cultivation for the past four to five years in various villages. Less than 12 per cent of the farmers failed to continue with SRI practices due to several reasons including extraneous ones such as severe perpetuated drought, sudden illness in the family and the combined problems of water and labour. The pertinent question is—what should be the policy perspectives to enhance the adoption of the technique on a wider scale and address the problems of food security and conjunctive use of scarce resources land, water and root system?

- The benefits of SRI are well documented in various advocacy media but require more efforts in policy communication.
- The provision of farm implements such as low cost cono-weeders, and markers need to be addressed.
- SRI, being more knowledge intensive, requires capacity building and longer term hand-holding of farmers.
- SRI requires the engagement of various actors in a convergence model. An innovative institutional mechanism is needed by bringing various streams, such as government line departments, service providers including infrastructure (irrigation, markets financial institutions, national agricultural research system, CSOs, extension system and farmers' organizations on to a common platform at the state level.

CONCLUSION

This is a longitudinal study initiated under the aegis of NCS, hosted by PRADAN, across the rain-fed areas in India. The objective is to understand the dis-adoption of SRI among farmers. On the basis of the data collected in the first phase in this year, it was

found that farmers are fully convinced of the merits of SRI in addressing the issues of household food security. The farmers cited a number of reasons for the adoption of this method of agriculture. Higher production in comparison with the traditional method of paddy cultivation is one of the major reasons why farmers are continuing with SRI. This is clearly visible in the food availability pattern of small and medium farmers. Savings in input costs is another important reason for farmers to continue with SRI. The dis-adoption of SRI, is caused by factors such as low rainfall, falling sick during a crucial stage of crop planning or persistent drought conditions. More empirical evidence is necessary to gain insight into the dis-adoption process in wider areas. Therefore, the study should be extended to more agro-climatic regions and capture variation. This longitudinal study plans to collect the necessary information in a larger sample, covering more than 1,500 farmers in the next two years, across India. On the basis of the experiences gathered in the survey of two districts of Bihar and Odisha, the survey tools, including a structured questionnaire have been refined. The repeat survey will also be instrumental in validating the results over the years and regions. A clearer picture of the adoption and the dis-adoption of SRI across India will emerge, hopefully after no more rounds.