



# Strengthening the Learning Alliance

## Scaling up options for SRI in Orissa

Dr. C. Shambu Prasad, Debasis Mohapatra, Piyush Mishra



Centre for World Solidarity



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# Abbreviations

ATMA	Agriculture Technology Management Agency
CRRRI	Central Rice Research Institute, Cuttack
CWS	Center for World Solidarity, Secunderabad
FFS	Farmers Field School
GO	Government Organization
ICM	Integrated Crop Management
IMAGE	Institute of Management and Agriculture Extension
KVK	Krishi Vigyan Kendra
LRP	Local Recommended Practices
NGO	Non Government Organization
NFSM	National Food Security Mission
NRA	Non Research Actors
OUAT	Orissa University of Agriculture and Technology
PRADAN	Professional Assistance for Development Action
PRI	Panchayati Raj Institutions
RA	Research Actors
RRTTS	Regional Research and Technology Transfer Station
SDTT	Sir Dorabji Tata Trust
SRI	System of Rice Intensification
SRR	Seed Replacement Ratio
SVA	Sahabhagi Vikas Abhiyan
VAW	Village Agriculture Worker
WTCER	Water Technology Center for Eastern Region
WWF	World Wide Fund for Nature
XIMB	Xavier Institute of Management, Bhubaneswar



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# Strengthening the Learning Alliance

## Scaling up Options for SRI in Orissa

C Shambu Prasad  
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When we first thought of taking up SRI (System of Rice Intensification) activities in the state in early 2007, the landscape of innovation was sparse and scattered. There was some experience on SRI by farmers and a few NGOs none of whom were aware of each other's knowledge. Yet, these actors were linking up with SRI actors from other states to access, experiment and even improve upon SRI practices. The results were extremely encouraging even in the very first cropping season without complete knowledge, training and availability of weeders and markers. Small, marginal and tribal farmers were excited about the implications of SRI for their food security encouraging us to explore options for policy support and expansion. The initial discussions that Prof Radhamohan and I and later Debasis Mohapatra had with some governmental agencies including the Directorate of Agriculture and Food Production was extremely encouraging. We were keen that the government recognises and builds on the SRI innovation capacity that these actors demonstrated. This led to the first multi-stakeholder workshop or the launch of the platform for Learning Alliance in the state in June 2007.<sup>1</sup>

The workshop created a unique platform where farmers, civil society, government officials and research organizations could share their experiences. We underestimated the time required for sharing and discussions and were

**The book that was released in October 2007 at the second national symposium on SRI at Agartala had a very good response from the emerging SRI community both in Orissa and outside. Other states were keen to take up similar alliances in their region bringing together the learning of different actors.**

overwhelmed by the response. We then decided to follow up on the workshop by documenting these rich stories from the participants or actors own perspectives. Even though we had to translate, rewrite many of the stories we were keen that the authorship remained with the key actors and were keen to bring the diversity of understandings on SRI and the worldviews they represent. The book that resulted was a unique volume of stories of 14 actors. Titled 'Towards a Learning Alliance', (Shambu Prasad, Koen Beumer and Debasis Mohanty 2007) the book that was released in October 2007 at the second national symposium on SRI at Agartala had a very good response from the emerging SRI community both in Orissa and outside. Other states were keen to take up similar alliances in their region bringing together the learning of different actors. The Peoples Science Institute in Dehradun for instance has evolved very interesting mechanisms

<sup>1</sup>Visit [http://www.indiawaterportal.org/data/conf/Orissa\\_dialogue\\_report.pdf](http://www.indiawaterportal.org/data/conf/Orissa_dialogue_report.pdf) for the workshop report.

to include government agencies in the SRI scale up operations in Uttarakhand and Himachal Pradesh. The modes and mechanisms of including the government in scaling up of SRI was discussed enthusiastically at a recent SRI partners meet in Bhubaneswar of the NGOs supported by the SDTT or Sir Dorabji Tata Trust.

## **Introducing the Learning Alliance**

The learning alliance dialogue workshop in June 2007 had set for the participants, many of whom were meeting for the first time, a rather ambitious set of objectives. These included:

- Building SRI innovation capacity in Orissa and thereby creating a new culture of innovation
- Creating a learning platform for agriculture officials on SRI
- Working on policy and institutional uptake – enabling policy framework, learning alliances
- Establishing procedures for zonal workshops and SRI monitoring
- Policy advocacy both within the state and at the central level.

At the time of the workshop our understanding of the theoretical literature on learning alliances was limited. But, like in SRI, we felt that we should let the practice inform the theory. Our (XIMB's) association with the Institutional Learning And Change or ILAC initiative of the international agricultural centres headed by Bioversity International ([www.cgiar-ilac.org](http://www.cgiar-ilac.org)) has been very helpful in better appreciating the theoretical ideas behind learning alliances. We have since used the phrase to refer to “a platform where a range of stakeholders come together with a common interest in innovation and the creation of new knowledge” (Lundy, 2005).

We feel that the concept is particularly useful for SRI in the Orissa context as SRI is a complex innovation that requires that actors learn together to unravel the principles and insights. SRI principles and practices have been spoken about in many cases leading to worked out package of practices. However, SRI as a *system* (the S in SRI) has not been sufficiently understood.

Initial experiences in scaling up in different parts of India and Orissa suggest that there is a greater need for changes in attitudes of all actors to find newer ways of doing things. Some learning can also be in the form of seeking solutions to avoid mistakes made in other states initially – and by learning from the positive. In all of these we are also hoping to create several institutional innovations - to create and enable new institutions of training, documentation, monitoring, research and evaluation. In all of these we believe that Orissa has a lot to contribute to the larger SRI innovation system and by offering to share our experiences, celebrate our successes and reflect on our failures, we will be active participants in the larger learning alliances on SRI. Networks have played an important role in the spread of SRI as an innovation and learning in networks occurs quite differently from formal organizational settings. The idea of learning alliance brings the criticality of learning in complex innovations such as SRI. SRI we believe in turn can offer interesting insights on the learning alliance concept having important implications for poverty reduction (Shambu Prasad 2008).

## **Changes in the SRI innovation system**

Rice in Orissa is predominantly a crop of the Kharif season. Concerns about stagnating and low productivity have permeated most discussions including the recently released Agricultural Policy document of the Government of Orissa. In this context, SRI has been seen as an important option for improving rice productivity. Some significant changes in the overall agricultural scenario have impacted SRI as well. The Indian government in recent times has sought to substantially increase public investment in agriculture through the Rashtriya Krishi Vikas Yojana (RKVY) and the National Food Security Mission (NFSM). The latter has specific mention of SRI and constitutes perhaps the first national policy on SRI. The Directorate of Agriculture and Food Production, Government of Orissa has utilised these opportunities for SRI scale up (see following chapter by the Director). The easy access of these schemes for

organizations other than government agencies remains a public policy concern though.

Encouraged by the success of SRI in rainfed conditions with small and marginal farmers, the SDTT came up with a plan for SRI uptake in eight states including Orissa through the Centre for World Solidarity (CWS) and its partners in six districts. The WWF Dialogue Project on Food Water and Environment also supported a trial with the Orissa University of Agriculture and Technology (OUAT). Further, the scale of operations of PRADAN (Professional Assistance for Development Action) in Northern Orissa and SVA (Sahabhagi Vikas Abhiyan) was increasing. Partners such as Sambhav have had experience sharing workshops involving several farmers and NGOs. Interest in SRI and the learning alliance idea encouraged XIMB to take up SRI as part of a Learning Laboratory case supported by ILAC with a view to understand knowledge intensive agricultural systems such as SRI. We also came to know, through Norman Uphoff, of an interesting development of private sector involvement on SRI in Orissa. The Syngenta Foundation was supporting SRI trials with Karntabya, a local NGO in Kalahandi, thus making the SRI innovation system more complex and interesting. The increased interest in SRI from different actors has clearly changed the climate of innovation in SRI in the state.

We felt a need to capture this ever widening set of actors and interests and realised that our own attempts through informal exchanges by mail and phone were insufficient to capture the dynamic nature. A map that was prepared in middle of January 2008 with WWF indicated SRI presence in 17 districts of the state. Information on this spurt in SRI activity was scattered and we felt the need to try and put these together in the form of a mapping and scoping study that could inform a strategy for realising the potential of SRI during the Kharif season.

## Objectives and methodology of scoping study

Given the rapidly changing scenario on SRI in the state XIMB was interested in conducting

a scoping study on SRI scale up in Orissa. Debasis Mohapatra, who works with Oxfam and supported some initiatives on SRI, was asked to lead the study with support from XIMB, WWF and CWS. The outcomes of the study were meant to:

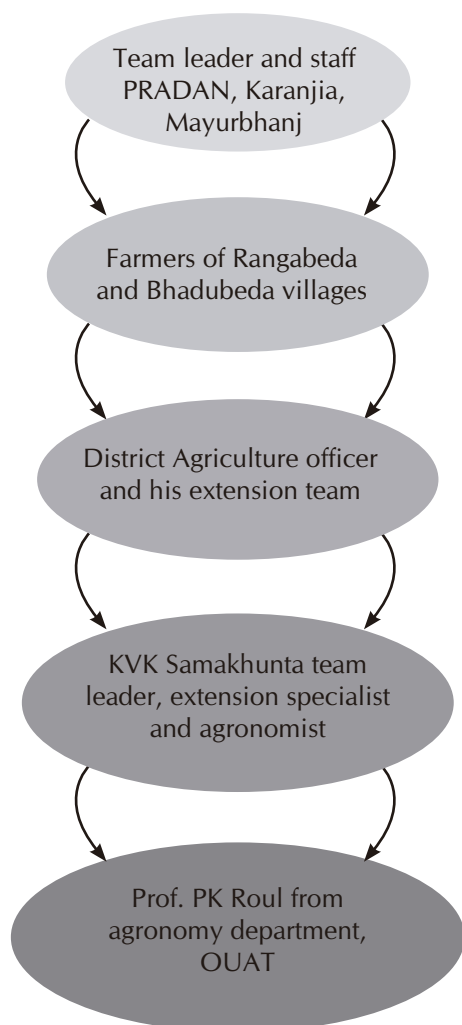
1. Provide a road map for SRI scale up in Orissa (who are involved, who needs to be involved and how)
2. Serve as a background for future discussions and workshops on SRI at the state level and develop capacities of the various actors involved. Continue the learning alliance approaches at the state and other levels.
3. Enable raising of resources depending on gaps and opportunities in the state
4. Help put together an approach, like the Learning Alliance, for evolving ways of taking SRI forward in other states as well. This could include new institutional mechanisms where state and civil society actors (including donors) could work together in synergy and optimise resources.
5. Provide insights on scaling up strategies for complex knowledge intensive agricultural systems involving multiple actors and sources of knowledge such as SRI.
6. Explore the possibility of starting a 'knowledge' or 'learning alliance' centre on SRI at XIMB for dissemination of information, conducting studies on a regular basis to feed into ongoing work. This activity need not be restricted to Orissa alone.

The main study was meant to be completed as a rapid appraisal during the months of May – June through extensive travel in the field to meet and interview the various actors. SRI stake holders were broadly divided into four categories, namely *Research Actors* that include CRRI, OUAT, WTCER etc., *Non-research actors* that include KVK (Krishi Vigyan Kendra), Facilitating NGOs and training Institutes, Agriculture department, etc., *Support agencies that include* Donor and nodal agencies like CWS, SDTT, WWF, OXFAM, Agriculture department etc. and *Farmers* (Individuals and groups)

The study team (Piyush Mishra joined the team) visited and conducted interview of all the stake holders as per a pre designed

questionnaire (a sample of this for an NGO (MASS) is attached in annexure 1 to indicate the nature of the questions and the responses). In most places the information flow was from facilitating NGOs to farmers then to agriculture department or KVK (Krishi Vigyan Kendra), then finally to their apex institutes based at Bhubaneswar. One such example has been mentioned for Mayurbhanj district in the flow chart below.

The team followed up with telephonic interview with many farmers, agriculture department officials, and NGOs. Research, non research actors and farmers were visited for direct interaction while Donor agencies based at Bhubaneswar, Hyderabad, and Kolkata were interacted with over telephone mostly. Three types of farmers namely non practitioner, neo practitioners and old practitioners were interviewed directly face to face. Twenty SRI practising farmers and ten non-SRI farmers were



selected and interviewed on random basis.

The study was designed to cover the major agro-ecological regions of the state. Hence, Mayurbhanj was selected for representing the Northern region, while Ganjam, Nayagarh, Cuttack represented east and coastal belt, Koraput and Rayagada represented south and Kalahandi represented western Orissa for sample purpose.

Pioneer agencies for SRI promotion in Orissa were selected. These included PRADAN, CWS partner agencies, etc. A few new or late entrants to SRI movement like Karrtabya and Harsha Trust were also selected. These agencies never had the opportunity to share their experience previously in Learning Alliance platform, but have all along been doing their bit of work silently in remote pockets of Orissa. An understanding of the work done by some research institutes like WTCER was gained with regard to their research agenda for SRI method standardization. Visit to NGO training institutes like Sambhav and Nayagarh helped to gain an understanding on how they support the SRI movement in Orissa. We also tried to study few agencies partnering with the Private sector, working in rain-fed paddy area of western Orissa with tribal farmers.

This study was a rapid and qualitative analysis. Ten lead questions formed apart of the questionnaire used for all the stake holders. It was piloted at Mayurbhanj district, then with some modifications was used in the remaining study districts. (See Annexure -1 and 2 for detail)

This study was to understand the perception and practice of different stakeholders. It was a qualitative study rather than a quantitative analysis. The sample size was relatively small. The study was done by a two member field team and one Principal adviser. The study also tried to analyze, some of the trends prevailing in SRI method of rice cultivation.

The study was followed up with a draft presentation of the findings in a workshop that was attended by Prof Radhamohan, Sabarmatee from Sambhav, Rekha Panigrahi from CWS,

Dr P K Roul from OUAT and Bipin Das from XIMB's Centre for Development Research and Training (CENDRET) in a workshop held at XIMB on July 1<sup>st</sup> 2008. The finalisation of the report got delayed for two reasons.

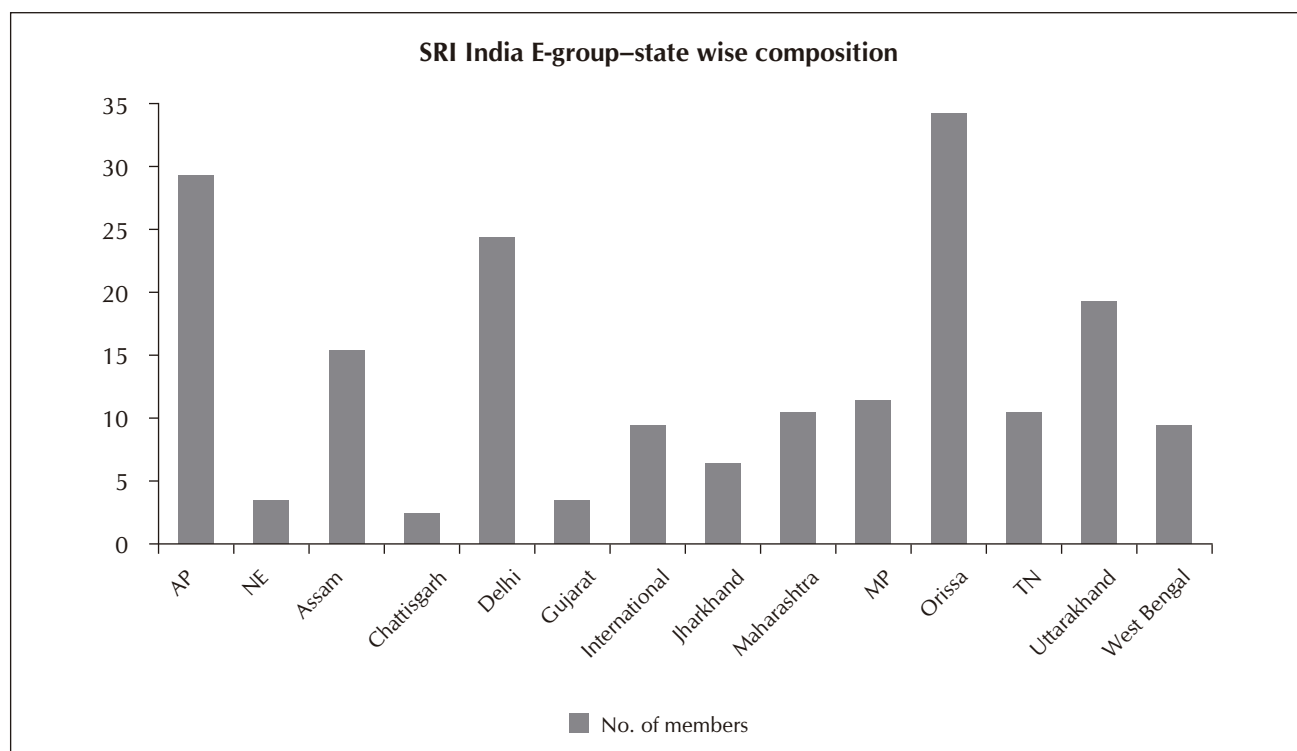
Firstly, the team felt we were getting outdated rather soon. With the kharif season underway there was a spurt of activity and the research team was challenged to update much of the information so as to include the kharif results as well. Our compilation of farmers in Koraput doing SRI was away by an order of magnitude. We discovered this at the documentation workshop in mid August at Nayagarh and used this lack of information to enlist greater sharing by the SRI actors of their own work. Shravani Roy joined the team and XIMB to follow up on the study by looking at a host of other information on SRI. We also tried getting information on the spread of SRI and the strategies chosen by different organisations so as to get a comprehensive and comprehensible picture of SRI.

We soon discovered that Orissa, otherwise known for its underdevelopment, had the maximum number of people in the SRI India

Google group that was started soon after the second national symposium (see figure 1 below). A social network mapping study of the SRI India group is underway and we expect to get some interesting results from that as well.

SRI actors in Orissa were leading some very interesting initiatives. There was a keenness to participate in SRI training sessions in Andhra Pradesh that immediately led to a demand for a documentation workshop on SRI with the farmer and soil in view. Noticeably in Southern Orissa a new slogan or call for SRI as a peoples movement came about. This was following the call made by Prof Radhamohan at an experience sharing workshop in February 2008. Farmers in Koraput started greeting each other *Jai SRI*. Jai referring to Jaivik or organic in Oriya and Sanskrit and SRI in Oriya would represent well being, indicating adapting SRI as an answer for the food security crisis in tribal Orissa. Clearly capturing all these was beyond the scope of the original study but we have tried presenting information that is up to date through sending additional questions and telephonic interviews as well. The report was also delayed because Debasis Mohapatra had to take up a full time job involving enormous travel with Oxfam in Hyderabad.

**Figure-1: State-wise composition of the SRI India google group**



## Learning Alliance update and structure of the book

What started as a small report on scoping options has now become a much larger enterprise. The current study on strengthening SRI learning alliance begins with this overview chapter and is followed immediately by a view from the Director of Agriculture who has been very supportive of SRI activities in the state. The chapter also provides the basics of SRI for the uninitiated apart from situating the productivity of rice within the All India context re-iterating the case for SRI. The report highlights the efforts of the department under the dynamic leadership of Dr Padhee and provides information on the costs of cultivation at the state farm and reported yield increase in different demonstration plots. Figures for the current Kharif season are yet to be compiled but it is evident that the government is looking towards SRI as an important option to increase the cropping intensity by expanding the area under Rabi where indications are that yield increases could be substantially higher. The chapter also indicates constraints faced and challenges that need to be overcome.

Chapter 3 presents an update of the various actors since the publication of the book in 2007. The information is focused less on SRI technical practices and more on the plans and perspectives of the actors. In this we have also sought to include additional case studies that have come to us almost in the last minute. The diversity of approaches is high. Amongst the civil society organisations there seems to be a greater shift towards organic practices with many organisations producing their own biopesticides and using green manure and vermicompost. This trend is encouraging given the larger context in this Kharif when serious fertiliser shortage was reported and several letters were sent by the state government for release of fertilisers from the central pool. The crisis in agriculture due to overdependence on chemical fertilisers was evident this Kharif when large advertisements were placed in newspapers indicating the rise in fertiliser subsidy to a whopping Rs 1 lakh crores this year. In such a scenario, systems such as SRI that help save on fertilisers clearly shows the way

ahead, although incentives for saving on costly inputs is not yet in place.

Another feature of the learning alliance is the extension of SRI as a peoples movement particularly in southern Orissa. This is evident in the accounts of Sambhav and Pragati and the larger Jai SRI movement. Notable also is the independent work taken up by most actors in accessing and manufacturing effective markers for local soil types. SVA and a few other organisations have adapted the Mandava weeder to Orissa and this has become quite popular even though there is currently no incentive for using this 'non-certified' weeder. The role of the private sector in SRI is likely to increase in the days to come and Orissa has witnessed the involvement of the Syngenta Foundation in Kalahandi district. The chapter ends with accounts of some of the more innovative farmers and farmer organisations.

Chapter 4 focuses on the farmers and the perception and awareness of farmers on various SRI practices. The study team sought to capture the awareness levels of SRI by the farmers and extension officials and how they look at the six principles of SRI. Local adaptations in water management have also been covered in this. The problems encountered by farmers and other stakeholders on SRI are indicated.

Pravash Chandra Satpathy's account follows this. Arguably one of the most innovative farmers of Orissa his enthusiasm for constant innovation at the age of 81 is worthy of emulation. Satpathy shares his experiments on direct seeding and the seed drill that he has innovated on.

The rich accounts of farmers and other actors is followed in chapter 6 by a closer attention to the scale up plans of various actors and constraints in upscaling SRI have been identified by the study team under three heads of technical, institutional and attitudinal. The book concludes with some recommendations in the final chapter which are more in the nature of a dialogue than a strait jacket policy. In fact the purpose of the whole book purpose is to promote the policy dialogue

through strengthening learning alliances. Thus, rather than being prescriptive they are presented as recommendations for the learning alliance to discuss, debate and decide in future learning alliance workshops. It is hoped that this report would lead to more joint work amongst the different actors in a synergistic manner. SRI and the learning alliances we believe can bring diverse actors together in other areas as well for a more prosperous agricultural Orissa.

Learning together often pushes existing institutional arrangements to become more open. The results can be surprising,

sometimes leading to reversals of traditional roles – extension agencies and civil society organisations doing research, and research institutions repositioning themselves as knowledge brokers. They could lead to new learning laboratories and platforms where researchers can learn, reflect and report even if they do not have all the answers. As researchers we see ourselves as playing our small role and hope to be pushed by the learning alliance towards seeking surprise. SRI for us has invited us to partake in several pleasant surprises.

*Jai SRI*

**Table-1: SRI organisations details in Orissa**

Sl. No	Organisation	District	No of Blocks	No of Villages	No.Of Farmers Practising SRI	Estimated SRI coverage Area (ha)
1	Pragati	Koraput	5	86	266	56.76
2	United Artists' Association	Ganjam	3	42	711	NA
3	CARR	Cuttack	1	NA	20	2.91
4	OPDSC	Rayagada	5	10		50
5	B O J B P	Nayagarh	5	50	376	88
6	SACAL	Gajapati	1	26	59	11
7	Sahabhagi Vikas Abhiyan	Kalahandi, Bolangir, Nuapada	13	126	1100	254.25
8	MASS	Sambalpur & Baragarh	3	19	8	5.75
9	PRADAN	Mayurbhanj	3	NA	1688	210
10	Sambhav *	Nayagarh	NA	NA	NA	
11	Karrtabya	Kalahandi	3	23	108	42.29
12	WORD	Keonjhar	1	6	5	0.37
13	VICALP	Ganjam,Gajapati	2	NA	10	5
14	RUPA	Dhenkanal	1	7	4	1.25
15	Vasundhara	Nayagarh	1	9	29	2.02
16	Madhyam Foundation	Khurda	1	NA	82	27.2
17	NIRMAN	Nayagarh	4	NA	28	4.16
18	Centre for Community Development	Gajapati	1	5	34	6
19	SPARD	Cuttack	1	2	8	1.85
20	SOLAR	Puri	1	3	NA	NA
	Total		46	414	4536	768.81
	NA	Data not available				

\* Functions more as resource centre and not direct extension

Source: Collated by XIMB through questionnaires and telephonic interviews

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WWF-Dialogue Project at the International Crop Research Institute for Semi Arid Tropics and XIMB.

[http://wassan.org/sri/Title\\_Book.htm](http://wassan.org/sri/Title_Book.htm),  
<http://ciifad.cornell.edu/sri/countries/india/SRIinOrissa07.pdf>

We also tried getting information on the spread of SRI and the strategies chosen by different organisations so as to get a comprehensive and comprehensible picture of SRI. Table 1 provides this detail as collated from twenty different organisations working on SRI in the state. Annexure 3 gives the details of organisations involved directly with SRI in the state.

# Upscaling SRI in Orissa

**Dr. Arabinda Padhee, Director of Agriculture and Food Production, Government of Orissa**

In a country like India and more so in an agrarian state like Orissa, rice production has a direct bearing on the income of farmers and on poverty alleviation. Therefore, newer initiatives to raise the production and productivity of rice should aim at such replicable technologies suited to the respective agro-ecological situations. System of Rice Intensification (SRI) has now come to be recognised as a method of rice production to enhance productivity, that involves specific management practices for the crop plant, soil, water and nutrients.

Rice being the staple food of Orissa, any attempt to improve the agriculture sector centres around raising the production and productivity of this grain crop. The productivity of rice in Orissa is yet to touch the national figure (Table - 2). It has remained stagnant for a couple of years in the last one decade and with positive interventions in the agri-input sector, it has shown a satisfactory increase since 2007-08. The yield gap can only be bridged through adoption of suitable technologies which are affordable by resource poor farmers.

The Agriculture Department of the State has taken an ambitious drive to promote SRI in a big way by incorporating it into various Government schemes and programmes. The importance of this innovative technology has also gained acceptance by a large number of farmers which becomes obvious from the area expansion under SRI over the last two years. NGOs and other Civil Society Organizations have extended a very good support in this endeavour that has now borne fruits. The

phenomenal increase in grain yield in the SRI plots has become a talk amongst the farmers and the stake holders all around.

**Table-2: Productivity of rice in Orissa & all India (in kg./ha)**

Year	Total Food Grains		Rice	
	All India	Orissa	All India	Orissa
1950-52	522	--	668	520
1960-61	710	906	1013	986
1970-71	872	847	1123	917
1980-81	1023	865	1336	1026
1990-91	1380	992	1740	1198
2000-01	1626	884	1901	1041
2006-07	1707	1213	2084	1557
2007-08	1854	1344	2203	1712

## Why SRI?

The yield stagnation of majority of crops, more so in rice is due to decline in input use efficiency. Water is the main input in Agriculture. It is estimated that one kilogram of rice is produced by consuming 5000 liter of water. 80 % of fresh water is used for Agriculture, out of which more than 50 % is consumed by the rice crop alone. Due to misuse of water by the agricultural production system, there is a huge loss of water, contributing to decline in water use efficiency as well as fertiliser use efficiency. Due to over use of water and population growth, the per capita availability of water is declining at a faster rate.

This drastic reduction will have far reaching consequences on rice production and

productivity. At this critical situation, we need to develop an innovative technology to “Produce more rice from every drop”. Hence, it is imperative to develop technology to increase water use efficiency in rice cultivation. Among the existing water saving methods, SRI is now acclaimed as the most efficient.

### Advantages from SRI

- 1) Saving of water upto 45-50 %
- 2) Reduces nitrogen loss & checks water pollution
- 3) Sustainable Production
- 4) Reduces cost of seeds up to 90 %
- 5) More head rice recovery
- 6) Reduced pest & disease problem
- 7) Higher yield & net return
- 8) Higher root volume
- 9) Promote large and diverse population of soil micro organisms
- 10) Early maturity by 7-10 days and
- 11) SRI is also a variety independent system.

### Technology practiced

Given below are some basic technical details on SRI

#### 1) Where SRI should be conducted?

- i) SRI should be practiced preferably in a well levelled land.
- ii) The land should have proper irrigation and drainage facility.
- iii) The soil must be fertile with more than 0.5% organic carbon.
- iv) The soil should be free from saline, iron toxicity.

**2) Seed rate** - The seed required per hectare is 5 kg.

#### 3) Nursery

- i) Raised bed of 100 m<sup>2</sup> is required for an area of 1 hectare of land.
- ii) The seed bed should be covered with straw after sowing of seeds till germination to avoid loss.
- iii) The bed should be prepared carefully.

**4) Age of seedling** – The seedlings should be transplanted in the main field within 10-12 days of showing.

**5) Uprooting of the seedling from nursery** – The seedlings are removed by scooping with phawrah or a GI Sheet along with soil without causing any damage to the roots.

#### 6) Preparation of main field

- i) Pre puddling with Mould Board plough.
- ii) Puddling with puddlers.
- iii) Allow the mud to settle for one day after puddling.
- iv) Prepare raised beds of 2 meter width.
- v) 30 cm channel in between a few rows to enable drainage.
- vi) Perfect levelling of beds.
- vii) Marking by marker to mark 25 x 25 centimetre squares on the bed.

#### 1. Careful transplanting

- i) Seedling removed from the nursery bed is planted in main field within 30 minutes.
- ii) Transplanting one seedling in one hill along with soil at a spacing of 25 x 25 cm.

#### 2. Nutrient management

In SRI method of paddy cultivation, the crop may be grown with or without fertiliser

- 2.1. Where the organic carbon level of the soil is less than 0.5, it is recommended to use basal dose of fertiliser during puddling along with FYM (farm yard manure).
- 2.2. When the soil organic carbon level is more than 0.5, SRI is conducted organically with following amendments.
  - 2.2.1 Green manuring
  - 2.2.2 Application of oil cake @ 250 kg./ha
  - 2.2.3 FYM – 5 tonnes/ha
  - 2.2.4 Vermicompost/Poultry litter @ one tonne/ha

#### 3. Weed control

- 3.2. Working with conoweeder at 10 days interval starting from 10 days after transplanting ;
- 3.3. Minimum 3 weedings are done for better weed control ;
- 3.4. Keep 2.5 cm water in the field & apply poultry litter/vermi compost before each application of conoweeder ;
- 3.5. Do not allow standing water to drain out after working with weeder.

#### 4. Water management –

- 4.2. The field is kept saturated to prevent drying up and surface cracking during the vegetative stage by giving light irrigation.
- 4.3. At late flowering to 10 days before harvest, maintain 1-3 cm. of standing water

### Government interventions to promote SRI

Even though the SRI method of paddy cultivation was practiced and developed by Father Henri de Laulanie in Madagascar in the mid 80's, its spread to a large number of countries is rather recent. In the State of Orissa, it was experimented for the first time by a few NGOs in 2005 -2006. The first Government initiative to promote SRI was taken in the year 2007, when demonstrations on this new practice was incorporated under Government schemes like Rashtriya Krishi Vikash Yojana (RKVY) and Agriculture Technology Management Agency (ATMA). The precursor to this intervention was a **Learning Alliance**

initiated by the Xavier Institute of Management, Bhubaneswar, in collaboration with few partner NGOs and funding agencies. Subsequently, the demonstrations and field experiments have been incorporated into all other schemes for rice development and now this method of rice cultivation has reached every nook and corner of the State. Training of official stakeholders along with other project partners and farmers have also been arranged at the field level.

The state Agriculture Department has carefully studied the performance of SRI in the farmer's fields. Researches conducted by CRRI (Central Rice Research Institute), Cuttack and Agronomy Department of OUAT (Orissa University of Agriculture and Research) have proved it worthy to introduce SRI in the state. In the year 2007-08 under Work Plan (Rice Development), 80 officers of State Agriculture Department were trained by the CRRI, OUAT & IMAGE (the State Agriculture Extension Management and Training Institute).

**Table-3: Demonstrations in different schemes**

Name of the scheme	No.of Demonstrations conducted	FFS conducted	Districts covered
Work plan- Rice Dev.	2136	178	15 districts 178 blocks
RKVY	2000	50	30 districts 314 blocks
NFSM	4516 (Kharif) 4000 (Rabi)	452 (Kharif) 200 (Rabi)	15 districts
ATMA	18195	51	30 districts

Size of the demonstration plot – 0.4 ha.

## Research findings

### A) Findings from CRRI

Varietal Response to SRI :

There is significant varieties response to SRI, as seen from the figures below.

**Table-4: Finding of varietal trail by CRRI**

Variety	Yield (tonnes/ha.)
Shesadri	6.3
KRH-2	5.70
CORH	5.24
JAYA	4.90
GURJARI	4.82.

**Table-5: Yield advantage (%) grain yield under SRI over normal (T.P)**

Variety	% yield increase over normal
BPT-17111	146
BPT- 5204	138
NLR 37654	118
NLR 145	97
JAYA	89
SWARNA	85
PUSA Basanti	80
White Poni	63

**B) Findings from OUAT****Table-6: Comparison on nutrient management**

Variety	Nutrient Management	SRI	Normal (T.P)	% increase in yield over T.P
Swarna	Organic	4.066	2.8	45
Swarna	Rec. fert (NPK) 80:40:40	6.74	5	35

Organic- Dhaincha as G.M + FYM 5 t/ha + vermicompost 1t/ha + karanj cake 250 k.g./ha  
(Organic 'C' content of soil before-0.71 %, after -0.80 %)

**C) SRI at IMAGE farm**

The benefit- cost ratio calculated for the SRI practice outweighs the normal method and therefore, proves economical.

**Table-7: Cost benefit ratio calculated at IMAGE farm**

Cost of Cultivation (in Rs. per hectare)			
Sl. No	Items	SRI	Normal T.P
1	Land Preparation	270	2350
2	Seed	75	450
3	Fertilisers & manures	3205	2000
4	Labour		
a)	Nursery raising	35	
b)	Transplanting	840	
c)	Weeding	3150	
d)	Irrigation	245	
e)	Harvesting & threshing	5250	
	Total Labor Cost	9520	10,500
5	Insecticides	–	1500
6	Total Cost of Cultivation	15,570	16,800
7	Cost of Produce	45,865(51.15 qtl./ha)	29,848(32.80 qtl./ha)
8	Net return	30,295	13,048
9	B:C ratio	2.95	1.78

## D) Demonstration results from SRI conducted in farmer's field by Agriculture Department

**Table-8: Yield Analysis of SRI Demonstration (Rabi- 2007-08)**

District	Nos.	Variety	Demo Yield Q/Ha	Control Yield Q/Ha	% of increase
Kalahandi	132	Lalat	59.76	43.11	38.62
Jajpur	2	Lalat	59.15	48.5	21.95
Bolangir	3	Lalat	54.32	28.72	89.14
Deogarh	7	Lalat	48.52	32.9	47.47
Sundargarh	1	Lalat	41.20	23.1	78.35
Dhenkanal	3	Lalat	73.2	83.0	(-11.80)
		Pratikhya	62.00	47.72	29.92
		Naveen	60.40	48.40	24.79
Total/Average	148		59.0	42.0	40.47
Khurdha	50	Lalat	50.21	35.65	40.84
Koraput	50	Khandagiri	65.32	33.00	97.93
Kalahandi		KRH-2	87.5	66.7	31.18
		Naveen	65.0	45.0	44.44
Ganjam	N.A.	JKHY 401	74.5	48.40	53.92
		MTU-1001	65.63	33.35	96.79
		Pooja	60.15	34.60	73.84
		Pratikhya	73.85	42.72	72.87

### Concept of SRI village

In the on-going Rabi season, the Agriculture Department as an innovative measure has adopted one revenue village in each of the 30 districts to convert the paddy plots in the selected villages into SRI practice. These SRI villages will become the focal point for quick dissemination of this new practice. Senior officials of the Government along with PRIs and public representatives are being involved in the spread of this technology. Publicity in mass media has been taken as an instrument to inform the farmers across the State. The jingles and creatives on SRI voiced and enacted by popular Oriya film stars have become extremely attractive, thus enthusing the farmers to try this new and productive method. The demand in the field for this initiative as reported by the extension personnels is extremely encouraging.

### Research findings

#### A) Findings from CRRRI

Varietal Response to SRI :

There is significant varieties response to SRI, as seen from the figures adjacent.

**Table-9: Varietal response to SRI**

Variety	Yield (tonnes/ha.)
Shesadri	6.3
KRH-2	5.70
CORH	5.24
JAYA	4.90
GURJARI	4.82.

**Table-10: Yield advantage (%) grain yield under SRI over conventional**

Variety	% yield increase over normal
BPT-17111	146
BPT- 5204	138
NLR 37654	118
NLR 145	97
JAYA	89
SWARNA	85
PUSA Basanti	80
White Ponni	63

### Constraints in SRI adoption

- In cases of small holdings of lands surrounded by normal flooded rice fields, it becomes difficult to control water at saturation level.
- Sufficient quantity of organic manure is not available.
- All the land is not perfectly levelled to practice SRI.
- The availability of conoweeder that is suited to particular soil type is a problem.
- Preparation of the bed before transplanting needs precision.
- It is risky to adopt this method in rainfed areas.
- All types of soils may not be suitable to achieve higher productivity through SRI method.

### Researchable issues

- (i) SRI technology for rain fed area needs to be developed. The following may be experimented to ascertain better outcome.
  - ◆ Dry/wet seeding of 2-3 seeds in a hill at a spacing of 25 × 25 cm.
  - ◆ Thinning and gap filling at 8-10 days after germination.
  - ◆ Applications of pre-emergence herbicide in case of dry seeding.
  - ◆ The normal working with weeder.
- (ii) Monitoring the nutrient status of rice in continuous cropping with SRI.
- (iii) Development of low cost power weeder.

- (iv) Development of low cost transplanter for SRI planting.
- (v) Use of chemical fertilisers in SRI method has to be evaluated, even though SRI is perceived to be an organic system.
- (vi) The use of herbicide as pre-emergence application and even to substitute weeding could be evaluated, however this may go against the cardinal principle of SRI to reduce or eliminate use of inorganic.
- (vii) Evaluation of rice cultivars of different maturity group for their suitability under SRI may be undertaken.
- (viii) SRI as an adaptation strategy to reduce vulnerability of climate change needs to be studied.

From the on-going experiments on SRI, it appears to be an excellent opportunity for raising rice production and productivity and reducing food insecurity. As it happens with any new technology, there are apprehensions in the minds of the farmers which could be addressed by experiments in the farmers fields as well as in the research plots. The Government of Orissa has put this new technology in the forefront to boost rice productivity and production and accordingly, demonstrations, Farmer Field Schools and exposure visits are being conducted under various on-going schemes. It is expected that SRI will revolutionise the rice production scenario in the State in the coming years.

# Learning Alliance

## Status and Action plans

This chapter speaks about the different actors involved in promotion of SRI in Orissa. As per the focus of the actors, we have divided them into three categories, research actors, non-research actors and innovative farmers.

### Research actors

Orissa is fortunate to have some premier research agencies working on rice and water production technologies. Some of these institutions are CCRI (Central Rice Research Institute), OUAT (Orissa University of Agriculture and Training) and WTCER (Water Technology Centre for Eastern Region)

#### CCRI (Central Rice Research Institute)

After the out break of Bengal famine, the Central Government, in 1945, established the Central Rice Research Institute (CCRI) at Bidyadharpur, Cuttack. It is one of the premier Institutes of ICAR (Indian Council for Agriculture and Research) under the Division of Crop Sciences. During the last 60 years, it has released 74 rice varieties and several package of practices (PoP) for up, medium and low land in rain fed and irrigated conditions as well as water logged saline conditions. CCRI conducted different studies on various aspects of SRI. The study "Evaluation of SRI with recommended package of practices" during 2005-07 came out with the following results.

SRI and Integrated Crop Management (ICM) gave significantly higher yield. The mean grain yield under SRI (5.92 t/ha in 2005 and 6.99 t/ha

in 2007) was higher by 21 and 24 percent over traditional practices (4.90 t/ha in 2005 and 5.64 t/ha in 2007). SRI gave about 7.5%-14.8% increase in grain yield over ICM in 2005 and 2006 respectively. Higher yield in SRI was realised due to more effective tillers per hill, longer panicles with more fertile grain per panicle.

Since the last three years CCRI has been experimenting on different aspects of SRI. These are bed method vs field method, 25 × 25 centimetre vs 20 × 20 centimetre, single seedling vs multi seedling per hill, early vs late transplanting of seedling, organic vs inorganic.

CCRI continues with these studies during 2007-08 and shared its finding with the officials of the Agricultural Department, Government of Orissa through training programmes and workshops. During our interaction with Dr. K. S. Rao, Head, Agronomy department, the study team could gather that they are conducting a research on increase in the total factor of production in SRI.

#### OUAT (Orissa University of Agriculture and Training)

Orissa University of Agriculture and Technology (OUAT), was established on 24th August, 1962 by the Legislative Act, 1665. In 1978, four Regional Research Stations with assistance from World Bank funding were established at Bhubaneswar, Chiplima, Keonjhar and Semiliguda to undertake location specific research. Another 13 Adaptive Research Stations were established to verify the research results

**Table-11: OUAT trial and result analysis for nutrition and water management aspects**

OUAT trial and result analysis for nutrition and water management aspects						
	Conventional Rice (qtl/ha)		Mean(qtl/ha)	SRI(qtl/ha)		Mean(qtl/ha)
	Standing water	Saturation	Mean	Standing water	Saturation	Mean
Organic*	62.0	63.3	62.6	66.0	67.0	66.5
Inorganic*	50.0	50.5	50.3	57.3	62.3	59.8
Mean	56.0	56.9	56.5	61.7	64.7	63.2

Dhanicha was common to all as green manuring.

generated in the Regional Research Stations. From 1983 to 1995, eight Krishi Vigyan Kendras (Koraput, Keonjhar, Balasore, Ganjam, Baragarh, Phulbani, Kalahandi and Kendrapara) were established. Till now OUAT has released 109 high yield varieties of different crops including 50 varieties of rice. The University produces 400-800 qtls. of breeder seeds, 8000-10,000 qtls. of foundation and 2000-3000 qtls. of certified paddy seeds every year. OUAT has also developed the technology for paddy thresher, low volume sprayer, zero energy cool chamber and many other agricultural implements.

The Department of Agronomy, OUAT has conducted research on “Nutrition management and spacing aspects of SRI” in 2007-08 with financial assistance from WWF international. Research was conducted to know the effect of organic and inorganic sources of nutrition on yield components and yield of rice at various spacing. Inorganic plots were sprayed with pesticide\* and Organic plots had foliar application of pot manure\*. Effect of sources of nutrition and water management on grain yield (q/ha) of rice grown with different methods was recorded.

The above experiments were conducted by OUAT and the results indicate that if rice is grown in conventional method (conventional spacing, standing water application) then an average of 62.6qtl/hectare and 50.3 qtl/hectare

yield is obtained in organic method and inorganic method respectively.

However if SRI method is used (one seedling per hill, 25x25 cm spacing) then for organic and inorganic method of cultivation 66.5 qtl/hectare and 59.8 qtl/hectare of yield is obtained.

Hence the above experiment proves that SRI Organic method with water saturation condition (Alternate drying and water supply) provides the best result of 67.0 qtl/hectare. So this should be adopted as a standard practice. The department is now planning to conduct a research on INM in the current year.

OUAT has facilitated six batches of training on SRI for NFSM implementing officials of district and block level agriculture officers and Village Agriculture Workers (VAW) and exposure visits to farmers from different parts of Orissa.

### **WTCER (Water Technology Centre for Eastern Region)**

Water Technology Centre for Eastern Region (WTCER) was established on 12th May, 1988 as National Research Centre at Bhubaneswar, Orissa. Its mandate is to undertake basic and applied research for developing strategies for efficient management of on-farm water resources to enhance agricultural productivity on sustainable basis in the eastern region.

\***Organic:** FYM 5t, Neem cake 3q, Vermicompost 4q/ac(30-16-15/ac) **Inorganic:** 32-16-16kg N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O/ac, **Pesticide-** Monocrotophos, Ediphenphos, (Propiconazole+ Streptocyclin), **Pot manure-** Cow urine 1 Litre + Cow dung 1 Kg + Jaggery 50 g + Neem leaves 1 kg + Callotropis (Arakha) leaves 1 kg + Pongamia (Karanja) leaves 1 kg, fermented for 8 days in an earthen pot

A major constraint to the improvement in agricultural productivity is poor water management arising both out of scarcity as well excess of the water. The real challenge to agricultural development in eastern India is to provide assured good quality irrigation water during dry season and drain out excess rain water during monsoon season. WTCER was established to address these challenges.

**Different experiments have been undertaken by WTCER since 2004 to evaluate SRI, some of these include:**

**Effect of spacing on yield under SRI**

The experiment was carried out in different spacing such as, 40×40 cm, 30×20 cm, 25×25 cm, 20×20 cm, 15×15 cm, 10×10 cm, 20×10cm and 15×10 cm but the 20×20 cm spacing produced the maximum yield.

**Effect of different varieties and duration on the yield of SRI**

Different varieties of different durations were experimented to find out the variety suitable for SRI. The varieties are, short duration (Khandagiri), medium duration (Surendra and Swara), long variety (Savitri) and hybrid variety (CRHR-7). It was observed that SRI method gives good yields irrespective of different varieties and duration.

**Use of different doses of chemical fertiliser (Nitrogen) :**

A test was conducted to ascertain the optimum use of nitrogen in SRI. Different trials were conducted such as, no use, 60kg/ha, N-90kg/ha, N-120kg/ha. From the above experiment it was observed that application of 90 kilogram nitrogen per hectare is better for SRI.

**Different irrigation scheduling:**

Another experiment on irrigation system was carried out by the organization. The different experiments are conventional flooding method and irrigating the field after one, three, five and seven days of disappearance of ponded water respectively. From the above experiment irrigation after 3 days and 5 days

of disappearance of ponded water found to be best for SRI. 21 % -35% water saving was observed as compared to conventional flooding method in this experiment.

**Update on non-research actors promoting SRI in Orissa**

Besides the above research actors a large number of organisations are involved in promoting SRI at the farmers field level. Most of these organisations are NGOs and CBOs working in the different parts of Orissa. The update of some of these organisations is:

**PRADAN**

PRADAN (Professional Assistance for Development Action) is an NGO working with India's rural poor in seven of the poorest states in the country. It promotes Self-Help Groups; develops locally suitable economic activities; mobilises finances; and introduces systems to improve livelihoods of the rural poor and sustain their progress.

The group comprises of professionals motivated to use their knowledge and skills to address the issues of rural poverty by working with the people at the grassroots. While working towards enabling the rural poor, PRADAN collaborates extensively with government agencies, banks, market institutions, panchayats, other voluntary organizations, and research bodies. PRADAN works in tribal pockets of Orissa. The study team interacted with Surjit Behera, team leader with PRADAN and other colleagues based at Karanjia cluster of Mayurbhanj districts. PRADAN is one of the pioneers in bringing SRI method to common farmers of Orissa.

During the discussion Mr. Behera shared, "PRADAN works on Food crop stabilization and high value agro-horticulture because even though most families have about 1 ha. of land, they are unable to grow enough food for the year. The household livelihood is heavily dependent on wage income mostly coming from distant migration. Thus, the key intervention under the project is to enhance the productivity of existing food crops and to help poor families

diversify into high value agro-horticulture. This is possible only after improvement in the status of the land and water resources owned by poor families. Interventions like introducing better quality inputs helps poor families adopt improved practices for cultivation. Past experience has shown that introducing good quality seeds and adopting improved practices has increased yields of food grains, thereby allaying food security concerns and releasing good land for alternate cultivation. Also, poor families are able to take greater risk to take up hi-value crops like seasonal and off-season vegetables, fruit tree plantation, other hi-value cultivation e.g. medicinal plants, floriculture, etc.”

PRADAN planned SRI as one such initiative to ensure the families food sufficiency. It introduced SRI after its experience in Purulia of West Bengal in the year 2003. The intervention was started with four families in 2003. In the current year (2007-08) they have a remarkable number of 1688 families involving 210 hectares engaged in SRI.

### Sambhav

Sambhav is an NGO based at Nayagarh District, Orissa. The NGO is the brainchild of Prof. Radhamohan who undertook the ardent task of planning out cultivation of trees and crops in its campus which was considered to be absolutely unfit and infertile. So much so that the agriculture scientists and foresters told him that his plan is Asambhav (Impossible). Today the sprawling diversity all over the place of flora and fauna is the result of his determination to turn the Asambhav(impossible) to Sambhav (possible). The organization is dedicated towards

the development of sustainable agriculture using organic methods. Sabarmatee secretary of Sambhav and her team are leading a successful model to demonstrate sustainable natural farming system. Sambhav is among the pioneer agencies to introduce and disseminate SRI in Orissa. They have been practicing SRI method in their farm for the last 3 years and have trained hundreds of NGO staff and government official relentlessly. They practice organic SRI. It has been organising various training programs on SRI and SRI allied issues. A team from Sambhav also travels from district to district to train farmers in their field situation. They adopt SRI to conserve hundreds of traditional paddy seed varieties. Sambhav has the potential to become an ideal resource centre destination for orientation and training of Agriculture department staff on SRI and attitudinal change towards SRI in organic method. In 2007-2008 Sambhav has organised various training programs on SRI like SRI experience sharing workshop, SRI documentation workshop (August 2008), Pest management workshop (October 2008), and has facilitated training and exposure for number of NGOs and farmers. The SRI documentation workshop was an attempt towards proper documentation of the initiatives of farmers and promoters. Pest management workshop was intended for organic pest management in paddy cultivation.

### SVA

Sahabhagi Vikash Abhiyan (SVA) literally means ‘Campaign for participatory development’. It is a group of several individuals and community based organizations, mostly working in Western Orissa. Founded by Ashoka-fellow Jagadish

**Table-12: Detail of training programs on SRI in the campus of Sambhav**

Sl. No	Type of Program	No. of Program		No. of Participants	
		Apr 07 - Mar 08	Apr. 08 – 5 Nov. 08	Apr 07- Mar 08	Apr. 08 – 5 Nov. 08
1	Experience Sharing Workshop	2	Nil	120	Nil
2	Trg/Exposure Visit Exclusively on SRI	6	7	208	213
3	Other Trg./Exposure Visits in which talked about SRI to the participants	43	18	1173	663
4	Video Shows	36	10		

**Table-13: Ideas emerged while working on SRI promotion**

1	Jai SRI Samaj	Group of practitioners/enthusiasts for Jaivik SRI (Organic SRI)
2	Jai SRI	Greet each other when we meet, talk over Telephone, send SMS/email or write letters.
3	Jai SRI Vahini	Cadres to promote SRI in Orissa and help each other to learn
4	Jai SRI Samman	Awarding/Recognising farmers/innovators/facilitators at state level for best practices/experiments/innovations in SRI
5	Jai SRI Corpus Fund	To raise Fund for promotion of Organic SRI.
6	Jai SRI Greeting Cards	Greeting Cards designed using paddy which carries message about SRI and indigenous paddy
7	Jai SRI Mukta Vidyalaya	Resource Center for Mutual learning on SRI practices and indigenous paddy
8	Jai SRI Cultural Troupe	Promotion of organic farming and SRI through cultural activities and Promotion of folk dance/song groups on SRI
9	Jai SRI Barta	Newsletter on SRI
10	Jai SRI Seva	Question –Answer Service/Help Desk for SRI promotion
11	SRI Tathya	Documentation of SRI experiments, study, research etc.

Pradhan it started in 1993 in reaction to negative consequences of the Green Revolution in irrigated and rain fed areas. Though the Green Revolution has brought a lot of benefits in food grain production to India, it favoured irrigated areas and subsequently the rain fed areas became very vulnerable. SVA found that traditional community water management systems that provided economically viable and environmentally sustainable alternatives to the farmers declined due to continued neglect. By demonstrating the benefits of traditional methods of irrigation and organising the shift to Organic farming, SVA aims to undertake participatory development.

SVA undertakes various activities to empower the poor both economically and socially and is one of the few organizations with a strong focus on agriculture. SVA operates in the districts of Kalahandi, Nuapada, Bolangir and Bargarh- which are some of the poorest in Orissa. Their grass root level work involves capacity building around agriculture, forestry and fishery. This work goes hand in hand with policy advocacy at the state and national levels. SVA publishes an Oriya newsletter titled Gram Swaraj Abhiyan that reports activities and perspectives. The

Newsletter reaches 700 villages and has 2000 individual subscribers, including nearly 500 grassroots NGOs.

### **Future prospects for promotion of SRI**

SVA sees SRI as a means of economic empowerment. The system of rice intensification benefits those who can share their labour and for irrigated lands. After scaling up to 1100 farmers in 2008 Kharif, SVA is planning to further scale up the practice in the coming Rabi. To achieve this, several experience sharing workshops have been organised in which farmers get the opportunity to interact with successful farmers and get motivated for adopting SRI.

### **CWS and Partners**

Center for World Solidarity (CWS) is a voluntary organization that works through a network of partnerships with voluntary groups, networks of NGO's and individuals to promote people centered, participatory development in five states of India namely Andhra Pradesh, Tamil Nadu, Orissa, Jharkhand and Bihar.

As a nodal agency, CWS is planning to scale up SRI through six NGOs (OPDSC, Pragati, SACAL,

**Table-14: Extent of operation of SVA**

Sl. No.	Training organised	farmers trained	Farmers practiced SRI	Area in acre	Varieties	Practices	Average no. of tillers	Average yield in Q/acre
During 2007 Kharif								
1	4	80	18	7.1	Lalat, 1010, swarna, Khandagiri, Kusuma	Spacing 25x25cm, planting 12-18 days old seedling, application of magic compost, weeding by weeder	36	24.3
During 2007 Rabi								
2	24	245	150	86	Naveen, lalat, khandagiri, Kusuma	Spacing 25x25cm, planting 10-12 days old seedling, application of Magic compost, seed treatment & Weeding by weeder	45	29.8
During 2008 Kharif								
3	76	2728	1100	628	Naveen and Pratikshayaa	Spacing 25x25cm, planting 10-12 days old seedling, application of Magic compost, seed treatment & weeding by weeder	48	28.4 (Average of 15 crop cutting till 31st Oct'08)

UAA, BOJBP, CARR) and their network of 22 CBOs in six districts of Orissa. This consortium project is operational in the districts of Koraput, Rayagada, Gajapati, Ganjam, Nayagarh and Cuttack. The project is supported by Sir Dorabji Tata Trust of Mumbai. It plans to reach 7000 farmers and 3000 acres of land in 355 villages, in the period 2008-11.

### **Pragati**

Pragati is an NGO working with tribal people of Koraput District in the field of NRM/forest protection and NTFP processing and marketing through community participation. During our interaction with a staff of Pragati, he was elated when he said "One of our successful experiments is *SRI demonstration in Kharif, 2006*". Pragati took up demonstration of SRI for 11 farmers in Koraput block and all of them harvested more than double their normal production through organic farming method. Small and marginal

farmers are adopting SRI in Pragati's area of operation. They observed that scaling up of SRI can address food security and check the spread of use of inorganic fertilisers and pesticides.

Pragati has arranged Farmer's fair and published leaflets and booklet on SRI and also demonstrated SRI practices at the district level festival 'Parab'. Officials from agriculture department, resource agencies and farmers participated and discussed different aspects of SRI method in the District level workshop on SRI organised by Pragati. Pragati also had the opportunity to share its experiences at the state level dialogue workshop on SRI and participated in the National Consultation on SRI at Tripura.

Pragati also creates awareness on SRI through meetings, leaflets, wall paintings, etc. Some of the tribal farmers are now in a position to spread the message of SRI in their village and beyond. The

## **SRI a hope towards sustainable livelihood – A case study by SVA**

Rikhiram Hans is a marginal farmer having 0.5 acre of medium land residing in Birighat village under Khariar block of Nuapada district. The 40 years old Rikhiram always struggled hard to sustain his life with three children partly from the half acre of land which fetched an average yield of 4 quintals paddy and partly by collecting fire wood from the nearby forest. In this hand to mouth condition, the livelihood of his family was frequently under risk due to his illness. In order to fulfill the inadequacy he migrated several times. But, his family burden compelled him to get back in a short interval leading a more miserable life.

After the promotion of SRI in the village during 2007, the SVA staff tried to convince Rikhiram to adopt SRI but he denied. He didn't want to take risk by planting single seedling at a wider spacing of 25 cm, which might bring proportionately lower yield in comparison to high density planting in traditional method.

However, an exposure to a SRI field and interactions with successful SRI farmers and continuous touch of SVA staff managed to convince him to adopt SRI during 2008 Kharif. He was supplied with 1 Kg of paddy seed of Pratikshya variety and a mandava weeder on hire basis from SVA.

Right from the nursery raising and transplanting, Rikhiram heard several stringent remarks from the neighboring farmers along with a forecast of lower yield. Although Rikhiram felt harassed initially he saw that when the first weeding was done, the condition of the field has improved a little bit. Five days after the first weeding tillering started. After the third weeding, the no of tillers reached 40 on an average. In addition to this he applied magic compost two times and concentrated upon the water management in the field.

Astonishingly, he got a yield of 14.4 quintals of paddy that fetched him about 9.1 quintals of rice meeting the average rice requirement of his family of 2.5 Kg/day. Not only did he benefit the additional yield of 10.4 quintals but, the input cost had also been reduced by 30%. In addition to the yield Rikhiram gets 25 kg of rice a month @ Rs. 2/Kg through his BPL card.

When asked about the utilization of extra income, Rikhiram told that he is going to repair his house and practice a 2nd crop in the residual moisture.

understanding on SRI of the farmers facilitated by the organisation is excellent. It shows the attempt of the organization in building the capacity of the farmers. Because of rigorous training programs on SRI the farmers are technically very sound and in a position to train other farmers and NGO workers. SRI is now adopted by 146 farmers (till Rabi 2008) in Koraput and Nandapur blocks”.

### **SRI Journey of Pragati**

Chronology of events:

- Got the concept by attending SRI workshop at Sambhav, Nayagarh in March 2006
- June 14th to 16th, 2006 organised a training at Sakti Bhavan, Koraput involving 25 farmers

- 11 progressive farmers of Koraput started SRI in 2.5 acre, Dibakar jani's 0.6 acre plot was made as demonstration plot in the same season July 2006
- In 2007 Kharif at Padua 1 acre SRI and 1 acre conventional method were grown side by side. At every 10 days interval, information was collected and recorded from both the fields
- Trial inference was that in up-land SRI can be grown successfully with less seed and organic practices. Result was 2 q yield in conventional plot while 3.85 q yield in SRI plot
- November 2007, published Koraput re Sri Dhana (SRI in Koraput), a book compiling information at a district level workshop.

## **Scale up strategy followed by Pragati**

Use SRI practicing farmers as trainers for new farmers.

Works as a partner agency for CWS

Grooms other NGO and CBOs (Surakhya, Samprat, WORD, GJS, NDPS and SIVA) as a net work partner for CWS.

### ***UAA (United Artists' Association)***

United Artists' Association (UAA) was established in the year 1964 by a group of like-minded youth to help the people affected by natural calamities. In the same year, several youth clubs started cultural programmes and drama for fund raising for welfare, emergency relief and establishment of library and educational institutions. UAA is devoted to the empowerment of the poor and supports people's organizations, NGOs and CBOs. It is located at Ganjam, a southern district of Orissa. UAA is one of the partner agencies of CWS and tries to spread SRI in Ganjam district with the help of local CBOs and farmer associations.

UAA first got to know about SRI in a meeting with CWS and CSA at Berhampur in March 2005 in which Prof. Radhamohan shared his experiences about his visit to the farm of Narayan Reddy of Karnataka. It was perhaps the foremost meeting to discuss SRI in Orissa. In April 2006 two staff members of UAA participated in the training programme on SRI held at Sambhav. In the same year they started experiments on SRI in three small tribal hamlets called Baidipada, Gamanda and Baiasahi, and one farmer from each village took up SRI in 0.10 acres of land. UAA believes in using the pure organic principle method of SRI and promotes the same. It practices pure organic SRI using different types of organic manure and pesticides. It also promotes vermicomposting at the farmer/farmer group level. The knowledge base of the team is very sound on the principles of SRI which helps them in popularising SRI in the district of Ganjam. While only 3 farmers participated in their SRI promotion program in the year 2006, in 2007 the number increased to 167 farmers and in 2008, the number reached 707

farmers. This shows the trend of spread effect of SRI.

### ***BOJBP (Brukhya O Jibara Bandhu Parisada)***

BOJBP (Brukhya o Jibara bandhu Parisada) is an NGO working for a long time on sustainable agriculture and organic farming in Nayagarh district of Orissa. It is a peoples' organization having its presence in 51 villages of 19 GP in five blocks of Nayagarh district. At present it is working on SRI promotion in partnership with CWS/SDTT project. Forty one farmers in 3.2 acres participated in SRI promotion in kharif 2007-08 where as the number increased to 335 in 84.8 acres in kharif 2008-09. Like other partners of the project, BOJBP also believes in the process of pure organic SRI cultivation. In 2007 they conducted 9 training programs for farmers and in the current year 2008 this has increased to 29 training programs for farmers and 1 for staff and facilitators. In 2008 they also facilitated 50 meetings and an equal number of cultural programs at the community village.

### ***CARR (Centre for Action & Rural Reconstruction)***

CARR (Centre for Action & Rural Reconstruction) is an NGO working in Badamba, Cuttack district. It is mostly involved in natural resource management and cooperatives. CARR started promoting SRI in the year 2006 with 27 farmers with support from CWS. Now they are a partner in the CWS/SDTT project on SRI Promotion. They work in association with 2 women cooperatives and a community forest management federation. In 2008 they have promoted SRI in 85 acres of land involving 295 farmers. Like other partners of the project they too believe in pure organic principle of SRI and promote production and use of organic manures and pesticides for rice production.

### ***OPDSC (Orissa Professional Development Service Consultants)***

OPDSC (Orissa Professional Development Service Consultants) is an NGO working for the development of tribal communities in Rayagada district of Orissa. The NGO first got to know about SRI from an article on SRI in LEISA INDIA magazine in late 2005. Subsequently it got more

information on SRI from a booklet published in Oriya by SVA, HIVOS, WASSAN and CSA named "**Chirantana Krushi Nimante SRI Ba Saghan Dhanachasa Paddhati**" (SRI for sustainable agriculture). They circulated this booklet among the NGO partners of *Rayagada Vikas Samukhya* and among other Organizations in Koraput.

During 2006-07 OPDSC organised two training programs in Jajpur village of Padmapur block in Rayagada district and Kodinga G.P. of Kosagumuda block in Nabarangapur District. Mr. Sisir Parija and Mr. Sabhapati Khadanga, Agriculture Experts from SVA facilitated these training programs. After the training OPDSC started experimenting SRI in the area. In the same year it also started SRI promotion in only 4 acres of land in Kosagumuda block of Nabarangapur district and Padmapur block of Rayagada district. These demonstrations were successful. The yield was good inspite of using less input in comparison to traditional method of cultivation.

Taking into account the success of the demonstrations and the interest shown by the farmers, OPDSC started thinking on promotion of SRI at a larger scale. During this process it came in contact with CWS–ORC and got involved in their SRI promotion project. The Project SRI and Sustainable Agriculture is now being promoted in 5 blocks of Raygada district, namely Rayagada, Kashipur, Padmapur, Ramanaguda and Bissamcuttack in partnership with 4 local CBOs [Pragati, PVMM (Palli Vikas Mahila Mandala), IRDS (Integrated Rural Development Service and BSMS (Bajrama Swestasevi Mahila Mandala)]. During this project it has a target of promoting SRI in 125 acres during the year 2008-09. The project is in progress. OPDSC is the nodal Organization in this consortium in Rayagada district and CWS–ORC is the coordinating agency at the state level in the SDTT funded project. During this period they conducted mass awareness campaign on SRI through video shows.

### **SACAL (Social Action for Community Alternative Learning)**

SACAL (Social Action for Community Alternative Learning) is another partner of CWS/SDTT

project. They are very new to SRI and started their journey in the year 2007. In the summer of 2007-08 they experimented with SRI involving one farmer. They got an overwhelming result. This encouraged 58 farmers to join them in the current Kharif season. During this period they organised 11 training programs for farmers and staff of NGOs involving 94 people.

### **Karrtabya**

Karrtabya an NGO based at Junagarh, Kalahandi was silently experimenting and supporting farmers since the last two years with financial support of Sizngenta Foundation and technical support of CRRRI and OUAT. This is the only example of private sector involvement in promotion of SRI in Orissa. The organisation got exposed to SRI in the year 2006 and started practicing it on the field in the same year. It was observed that the average per farmer SRI coverage is nearly 2 acres in comparison to all Orissa average per farmer SRI coverage which is less than 0.4 acre. Karrtabya has really started to scale up SRI in terms of farmers and area coverage. The contributing factors to this situation are availability of assured irrigation, efforts of Karrtabya and support of local agriculture department (AAO). But the organisation faces the problem of availability of implements.

The NGO tried to develop the weeder and marker locally but failed. Now they procure these implements from Andhra Pradesh. For the current year they have procured 200 Mandava weeder from Andhra Pradesh to cater to the needs of 1000 SRI farmers. They also conduct various training programs for the farmers at regular intervals. The farmers of the area expressed their satisfaction over the yield of rice and hay (straw). They practice five principle of SRI except the use of Organic method. During the discussion some farmers of the area focused on the depleting livestock population as a major set back for adopting organic method. The livestock population is decreasing day by day after the Indravati Irrigation Project started since the grazing fields are gradually being converted into agriculture land. The effort of the organization in promoting SRI in Kalahandi is commendable.

They have started SRI with 7 farmers in 0.48 hectares in the year 2006-07 and reached upto 84 farmers in 30.28 hectares in the current year. Now they are planning to reach 1000 farmers in the coming season.

### **Harsha Trust**

**Harsha Trust** is a non profit organization, working with the tribal community in remote parts of Orissa. They focus on sustainable use of natural resources and promotion of livelihood. They got exposed to SRI at PRADAN in 2005. They experiment with SRI with a limited numbers of farmers in Raygada district. In the kharif season of 2008-09, 20 farmers were encouraged to take up SRI.

### **Vasundhara**

Vasundhara is an NGO involved in research and policy advocacy and works on environment, Forest conservation and sustainable livelihood. Vasundhara was initiated to support and strengthen community-based initiatives to protect and conserve forests in the state of Orissa.

Vasundhara facilitates SRI and organic paddy cultivation in Nayagarh District. Out of 17 farmers who introduced SRI in 2007, 5 farmers got a better yield where as 7 farmers got no yield advantage over traditional method. Exact yield information from the rest of the farmers was not collected. An analysis of the information by Vasundhara indicated that some farmers had not taken the water management principle seriously and adopted the age old practice of flooding method. Due to non-availability of Weeder the crop was affected.

The other constraint or challenge for SRI is pest and disease control and management. Bio-pest management system in farming needs to be developed for which a lot has to be explored. Findings of other groups working on similar issues can be useful for promoting SRI. Convincing farmers on SRI was a constraint in the initial stage but gradually they are seen to be accepting it.

### **SPARD: (Society for People's Awareness and Rural Development)**

SPARD (Society for People's Awareness and Rural Development) is an NGO situated at Niali block of Cuttack district. It works with the local community on organic farming and indigenous seed preservation. They found SRI to be very remunerative as the yield is nearly 25-30 qtls/acres. They also believe it will be very useful for the seed production program and will increase the SRR (Seed Replacement Ratio) among the farmers. State agriculture officers (DAO, DDA, Agriculture Secretary and Director), OUAT professors, scientists from CRRI, Cuttack, press people and farmers have visited their demonstration field and appreciated their effort. They promote pure organic SRI as it is eco-friendly, needs less water and no chemical fertiliser and pesticide. SPARD is hopeful that SRI can be very useful for conservation of traditional paddy varieties.

### **MASS (Manav Adhikar Seva Samiti)**

MASS (Manav Adhikar Seva Samiti) is an NGO working currently in the field of agriculture with presence in Sambalpur and Baragarh districts of Orissa. It was on June 23, 2007 at a workshop by IMAGE, conducted by the 'Learning Alliance' that heralded a new beginning on SRI in MASS's areas of operation. In the same year it conducted 10 farmer trainings, specifically on SRI and persuaded farmers to opt for SRI with one-to-one discussions. Within less than a month, the idea that was carried forward from the workshop translated in seven SRI trials in 2.3 acres of land of five villages in Paikmal block of Bargarh district and 0.3 acres of land in one village of Jujumura block in Sambalpur district. Considering that the cropping season was already on that was a great success. Though as a concept SRI was not unknown at MASS, it was never seriously discussed or practiced till then.

MASS is convinced that SRI method can bring more production and income to farmers. At present 24 farmers in 14 villages of three different blocks in Bargarh and Sambalpur district have been motivated to take up SRI trial in about 9 acres of land. The average size of trial fields are 0.2 acres to 0.4 acres. Among these farmers, four have

been linked with the government's SRI promotion scheme. Besides this, MASS has tried SRI in one of its own field demonstration centre in Jujumura block of Sambalpur district. But, rainfall played a major spoilsport and transplantation was delayed. This spoiled the cultivation agenda of many farmers as their seedlings grew older. Only twelve farmers were able to transplant the seedling in the main field. This has been a major learning. From the next year MASS has planned to advise the farmers to prepare two nurseries, seven-ten days apart, to meet this kind of emergencies.

### **CCD (Centre for Community Development)**

CCD (Centre for Community Development) is a voluntary organization working for the socio-economic empowerment of tribal communities in Gajapati District of Orissa for the last 15 years. They focus on education, community health, micro entrepreneurship and natural resource management. In the year 2005 they got to know about SRI through a T.V. programme (E.T.V. Annadata). They started an organisation level demonstration in the same year and got a yield of 11.25 tonnes per hectare from their 10 cent plot. In 2007 they facilitated 5 farmers in taking up SRI and in the current year 2008 they have involved 25 farmers. The tribal farmers are getting an average yield of 19.50t/acre under SRI, which is much higher than the conventional method average yield of 0.75t/acre. During this period the organization also conducted 9 training programs on SRI involving 272 farmers and 41 events for awareness campaign.

### **Nirman**

NIRMAN is an NGO working in Nayagarh district. The NGO's experience shows that there is good growth of the tillers (30-50) from single plant. Out of 14 farmers, 12 farmers have been very successful and in two cases the results were not so encouraging. This was because the farmers did not follow the SRI principles wholeheartedly and also because of water stagnation in the field. A finding shows that cow urine is the best option for seed treatment and priming.

### **WORD, Keonjhar:**

WORD is an NGO working in tribal pockets of

Keonjhar district. 27 farmers from 9 villages are introducing SRI paddy cultivation in 11.25 acre.

### **IDEI (International Development enterprise, India)**

IDEI is a not-for-profit enterprise committed to providing long-term solutions to poverty, hunger and malnutrition. They stimulate a sustainable and free market by creating demand for affordable technologies and ensuring a sustainable supply chain.

IDEI had the opportunity to participate in a workshop on SRI at Cambodia way back in 2003. But only in 2008 with support from SDTT it started a project on SRI in three states (West Bengal, Bihar and Assam). IDEI has come out with a plan to identify the gaps in supply chain of weeder and markers and to initiate a supply chain for these implements like their KB Pump promotion model.

### **Innovative farmers and farmer organisations in SRI**

There are some innovative farmers and farmers' organisations in Orissa who are practicing and promoting. The update on some of these farmers those who dared to adopt the technology are:

#### **D Narayan**

D Narayan is a farmer of Ganjam Districts and perhaps one of the pioneer farmers experimenting with SRI in Orissa since the last 3-4 years. He practices SRI method in 8 acre of land in an organic way. He is an ardent supporter of SRI and has become a trainer for the past 3-4 years sharing his hands-on experience. He also experiments with various practices of organic farming. During the discussion he shared an interesting observation about navadanya seeds (nine types of seeds) for green manuring. He claims that use of these seeds as green manure contributes to productivity significantly. This also arrests pest and disease attack in SRI.

#### **Pravas Satpathy**

Pravas Satpathy is an 81 years old farmer of Mayurbhanaj district. He does not believe in

accepting or rejecting any new ideas without experimenting it. He has been experimenting with SRI for the last 3 years in his field. During this period he has accumulated a knowledge bank on SRI. He has developed/modified many low cost new practices and implements and has been using those in his field. He has also documented his experiences and experiments on SRI. Now he practices direct sowing of paddy seeds with the help of a modified seed drill. This knowledge needs to be documented properly and published for wider dissemination among other farmers. See chapter-5 for details about his modified seed drill.

### **Laxman Nayak**

He is a poor farmer of Kalahandi district, but is the first adopter of new agricultural practices. He adopted SRI method following the advice of Karntabaya (a SRI promoting NGO) in his field. He is one of the pioneer farmers to adopt SRI in Junagarh block of Kalahandi district. He now cultivates rice using SRI method in 2 acres of land and motivating a large number of farmers, who have started discussing on SRI looking at Laxman's success.

### **Rushikulya Rayat Mahasabha (RRM)**

Rushikulya Rayat Mahasabha is a farmers' organization in Ganjam a coastal district in Orissa. The organisation was an initiation of some farmers of the area after the severe flood

in year 1991. More than 1700 farmers from four blocks (Chhatrapur, Ganjam, Purusotampur and Hinjili) were associated with the organisation. It mainly works in the area of farmers' right and some other issue based activities like distress sale of farm produce, agriculture insurance, irrigation problem etc.

### **Experience in SRI**

RRM officials attended a training program organised by CWS in Beharampur in February 2006, and participated in a SRI workshop at IMAGE (Institute on Management of Agricultural Extension) in Bhubaneswar in 2007.

Enthused by the prospects of SRI for sustainable agriculture, RRA decided to undertake trials immediately in Kharif 2006 and carried out the practice in the farmers' field in partnership with UAA (United artists' Association). In the first year there are eleven farmers who braved to take the challenge. Adoption of SRI practice in the organic way witnessed a remarkable higher yield in comparison to conventional method.

The success of the initial trials propelled them to continue with SRI in Rabi as well. In the following years SRI was extended to more farmers in all the four blocks. Despite difficulties in water management (irrigation and drainage) the crop yields were higher in almost all cases. In 2008 Kharif they spread SRI to the field of 384 farmers.

## **Case study of a SRI farmer**

Bibhuti Das is a 35 year old farmer in Patapur village of Chhatrapur block in Ganjam district. He lives in a joint family of 7 members in which he is one of the two bread earners. The prime occupation of the family is farming and Bibhuti has been in the same occupation for the last 17 years. The family owns five acres of agricultural land.

In 2007 he first heard about SRI in a meeting organised by RRM (Rushikulya Rayat Mahasabha). In the same year he dared to take up SRI in 40 decimal land in the kharif season. He selected a local variety paddy (Swarna Masuri) and took up SRI in organic method. He planted the seedlings at the age of 18 days and two seedlings per hill because of irrigation problem. He faced problems related to water management and weeding. However despite all these constraints he managed to get a yield of 16 bags of rice in comparison to earlier yields of 8 bags in conventional method.

Being encouraged from the first year's experience in kharif 2008 he is growing rice under SRI principle in 60 decimal land.

# Finding and Analysis on Prospective and Perceptions of SRI

The study team developed and asked 10 simple questions to farmers and other stakeholders for understanding their practice and perception about SRI method. Analysis on response is clubbed to get the following six key perceptions and practices. These are early and careful transplanting, one seedling per hill, maintaining wider spacing (25cmx25cm), weeding by use of weeder, proper water management (alternate wetting and drying instead of stagnant water) and use of organic method. Questions were asked to analyze the farmers' situation of adoptability and acceptability. Similarly, the same set of questions were put forth to other stake holders like NGO staff and Agriculture department officials to understand how they have internalized these basic facts and gear their support system for farmers.

## Findings on use of SRI principles

Study team's Analysis on perception and practice of sample farmer in different districts

### Early and careful transplanting

Awareness on early and careful transplanting is increasing slowly. Most of the farmers who have access to assured water sources are able to transplant in second week. However, those farmers who are dependant on rain water are not able stick to the timeline even if they are aware about the positive results of early transplantation. We found sample farmers from different parts of Orissa adhering to this principle where irrigation is available. But in most cases transplantation gets delayed because of non availability of proper irrigation system. However, we came across a trail of an innovative farmer of Mayurbhanj (P.C.Satpathy) who uses the seed drum to avoid the problems in transplanting. (Discussed in the next chapter)

### One seedling per hill

Observations from all over the sample district and from sample farmers indicates that they have

**Table-15: Practice of SRI Principles by Farmers**

Principles	District wise use of principles by farmers				
	Mayurbhanj	Ganjam	Rayagada	Koraput	Kalahandi
Early and careful transplanting	4	4	4	4	4
One seedling per hill	4	4	4	4	4
Wider spacing (25 cmx25cm)	4	3	3	4	3
Weeding by weeder	4	2	1	2	3
Proper water management	3	2	1	2	3
Use of organic method	2	4	2	3	1

\* Points are perceived as (1. Minimum, 2 average, 3 Better 4. Maximum)

understood the importance of one seedling per hill. All the promoting organizations too have the confidence that one seedling can produce enough tillers to harvest a bumper crop. However, when there is late transplanting the farmers opt for two seedlings per hill.

### **Wider spacing**

The age old practice has been to transplant seedlings densely, maintaining very close spacing (5x5-7.5 x7.5 cm) and farmers also think that they will get more return by maintaining more plant population. But SRI method advocates for more (25x25 cm) spacing. It therefore becomes very difficult to convince the farmers about this principle initially as they are habituated to the age old practice. It also requires an implement for marking and skill training on transplanting. However, distant spacing of 25x25 cm is popular among most of the SRI farmers across Orissa. But the use of marker is quite limited because of non availability of markers. In some areas low cost markers made up of Bamboo and wooden planks are developed by using local technology. Some farmers adopt rope method for marking operation which is very time consuming. Some Government extension workers and researchers are doubtful whether all the varieties will respond to wider spacing of 25cmX25 cm. They opine that different varieties require different spacing to get optimum harvest. However, during our discussion with OUAT and CRRI scientists they recommend the spacing of 25cmx25cm as the optimum spacing for obtaining maximum effective tillers, panicle and yield.

### **Weeding by weeder**

In conventional method of rice cultivation, farmers do manual weeding and in some cases they spray weedicide to control weeds. In SRI, the land is kept in water saturation and no standing water is maintained. It boosts the problem of more weeds and manual weeding becomes expensive. So the method advocated is mechanical weeding with the help of manual weeders. This process also produces organic compost which is beneficial for the rice crop. It also helps in improving the land texture

and structure. Most of the farmers are seen to adopt this new method of weed management to increase productivity. However, access to appropriate weeder is still a major challenge. Supply of one category of weeder for all types of soil is a problem and this issue needs to be addressed.

The weeder operation is also restricted because of improper transplanting due to absence of markers. But some farmers have indicated that they undertake weeding operation 2-4 times during the crop cycle. They start this operation at an early stage of 10-15 days and continue with 10 days interval. It was observed that mediation of NGOs to procure/supply weeder to farmers at the time of requirement is a crucial factor. NGOs like PRADAN, SVA and Karrtabya have contributed significantly on promotion and/or by procurement of weeders from outside the State and supplying it to the farmers at the correct time. Further experimentation at research institutes is required on drudgery reduction and effectiveness of the weeders. In this context, International Development Enterprise India (IDEI) has come out with a plan to identify the gaps in supply chain of weeder and markers and to initiate a supply chain for these implements like their KB Pump promotion model.

### **Proper water management:**

One of the 6 crucial principles of SRI is alternate wetting and drying up of field, to maintain the soil saturation, instead of flooding the field. This has been difficult in most of the cases in Orissa as there is no proper water management system (Irrigation and drainage). The scientists and agriculture department staff are addressing this issue with foremost emphasis. Some of them recommend channel to land irrigation system rather than the prevailing land to land system to tackle this problem. We found some instances of micro level solution for this in Mayurbhanj district. This is the 5% model of irrigation promoted by PRADAN. (Discussed in the box below) The major problem in the costal district and in some parts of western districts is of proper drainage system. Because of no/improper drainage system the farmers are not in a position

to opt for proper water management. But during our visit to the field of PRADAN, Mayurbhanj we came across a system for proper water management at the micro level. This is the 5% model of irrigation promoted by PRADAN.

### **Use of organic method**

Pure organic principle of SRI is perhaps not acceptable to government officials and this remains a debate between government officials and some NGOs. It needs to be further experimented and recommended appropriately by the research agencies. Lessons can be learnt from practicing farmers who adopt SRI on pure organic principles. New practices like azo-rhizobium spraying in dhanicha crop to enhance green manuring needs more research. Green manuring by broadcasting of navdhania

seeds (3 types of pulse, 3 types of oilseeds, 3 types of spices) before main SRI cultivation and incorporating the same to act as a green manure crop can arrest insect and pest attack as well as get more rice yield. Similarly use of pot manure, Vermicompost and verminwash in rice field can increase the yield substantially. This practice is followed by women farmers of UAA and PRADAN at Ganjam and Mayurbhanj respectively. Seed treatment with Humus application in SRI was shared by Pravas Satpathy, an innovative farmer from Mayurbhanj, whom many agriculture experts interpret as a true scientist for his scientific way of analysing problems and finding solutions.

Dr. P K Roul, department of agronomy from OUAT emphasizes that nutrition management

## **5% Model of water conservation**

5% model is a viable alternative to guarantee irrigation assurance for paddy crops to marginal farmers. This treatment is suitable for a patch of field with unidirectional slope where the crop fails due to regular water stress. The patch should have good soil cover with moderate porosity. The norm of allocating 5% area is not sacrosanct. One needs to consider land condition and farmers' preferences and other crop plans. A bigger pit is required to store more water. While laying out the pits in successive plots along the slope, one needs to make it sure that the pits are rather staggered and not in a straight line.

### **What is 5% model?**

This is a model of in-situ rain water harvesting, suitable for medium up lands. In this, 5% area on the upper part of each plot is converted into a 6' deep pit. The pit stores a part of the run-off which would otherwise flow out of the plot. When such plots are dug in a series over a contiguous patch of agriculture lands, the soil moisture condition improves and does not let the crop in the whole patch dry even if it does not rain up to a month.

### **Advantages of 5% model**

Though the total rainfall seems to be normal in many years it is erratic for the crop cycle. In this situation 5% model is very much useful as it maintains the soil saturation and if required the farmer uses the stored water to irrigate the land in extreme conditions.

### **How is it constructed?**

First select a patch of kharif paddy crop land which is dry quite regularly due to erratic rainfall. Measure the length and width of the each individual plot. Demarcate 5% area of the plot. Mark an area of one fifth of the length and one fourth of the width at the upper corner of the plot to dig the pit. The pit is then dug to the following dimensions. Depth 5-10 ft. depending upon the type of the soil with a wall slope of 1:1. The excavated soil is used for land leveling and strengthening the bounds. Make a small 4 inch high bound around the pit to keep some standing water in the field.

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aspects of SRI cultivation needs to be experimented in the coming season and so that standard recommendations are made to clear all confusion among the stakeholders.

From the sample interaction with the farmers we found practice of pure organic method in SRI method of cultivation is most popular among Ganjam and Koraput farmers. Farmers of Raygada and Mayurbhanaj practice integrated use of organic and inorganic matters for SRI. While in Kalahandi sample farmers were found to use less/no organic in SRI. From this we can presume that the promoting agencies in these areas were exposed to SRI from various other sources. Some route organizations have belief in pure organic where as others don't have.

## **Findings on training and capacity building**

It was found from the sample study that training and capacity building plays a major role in promoting and popularizing SRI. NGOs are also giving more emphasis on this aspect. They organize exposure visits, trainings, demonstrations for the farmers as well as for the staff of the organization. Some of the farmers also conduct inter-state exposures to Andhra Pradesh, Tamilnadu and West Bengal. Organizations like Sambhav, PRADAN and SVA have been organizing structured training program for NGO staff and farmers for the last couple of years. OUAT had also facilitated six batches of training on SRI for NFSM implementing officials of district and block level agriculture officers and Village Agriculture Workers (VAW).

SRI facilitators need to work hand in hand with farmers and a cadre of workers with detailed training on theory and practical sessions needs to be promoted. Sambhav, one of the leading NGO promoting SRI has come out with a plan to promote a cadre of such bare foot facilitators in the near future.

It was observed during the study that many scientists and extension officers have a negative attitude towards SRI. Some of them are insufficiently aware about the principles

and practice. Most of them don't believe that productivity can be increased using the organic way. It therefore becomes very essential to change the attitude of these scientists and extension officials.

However, the study did reveal that the spread of SRI knowledge among government officials is increasing. Some officials are aware about SRI in training programs and sharing workshops organized by NGOs like Sambhav, Pragati, SVA, etc.

## **Perceptions of stake holders**

### **Farmers**

SRI as a new method of rice production is being popularized among the farmers by NGOs and Government department since the last couple of years. Farmers pay attention to this method because of the positive aspects of SRI. Tribal farmers are interested in SRI as it provides 2-3 times more yield in comparison to their conventional broad casting method. The requirements are also less in terms of seed (2-3 kg in comparison to 45-50 kg), labour and expenditure on fertilizer, medicine and pesticide. The yield is substantially more through more tillers, more and long panicle, bold and bigger grain and less chaffy seeds. The incidence of pest and diseases is also very less. The quality of hay/ straw (chhana) is quite good. Some of the farmers also stated that the quality of hay is suitable for mushroom cultivation. Some farmers also shared that SRI method requires less expenditure on preparation of nursery raising bed and main field. The texture and structure of soil has been noticed to change by adopting organic method of SRI cultivation. Less money is spent on watch and ward of nursery from pest and animal, as only 10-12 days seedlings are being transplanted. Supply of quality seed can be ensured, so SRI is a boon for seed production program. In SRI farmers are able to use better quality seed as the requirement is less. Some farmers shared from their experience that SRI paddy plants are strong enough to withstand high wind without lodging. It can also withhold temporary scarcity of water upto 15 days.

## “I Got the Answer”- The voice of a successful SRI farmer

L. Dora.Baboo is a farmer of Kalahandi, one of the most backward and remote district in Orissa. (*Famous worldwide for its poverty and drought*). Doora originally belongs to Andhra Pradesh, where he got exposed to SRI in 2003 but, he didn't have enough land to cultivate rice. Then he purchased 8 acres of land in Kalahandi 2004, where the cost of land was low because farmers were giving up agriculture. He took up agriculture (paddy cultivation) when the majority of the farmers were quitting it. Even some of the agriculture scientists advocate that, “farmers should stop paddy cultivation as it is no more rewarding.”

Dora started his SRI journey in the same year as the pioneer farmer in Orissa to take up SRI at a large scale. The entire patch of 8 Acres is well irrigated. (Thanks to Indrabati Irrigation Project) He started experimenting SRI in 4 acres in the kharif 2004. He tried two varieties MTU- 1071 and MTU- 7029 and followed all the principles of SRI except 100% organic. He procured 2 markers and 20 weeders from Andhra Pradesh for marking and weeding operation. He also imparted training to local persons on transplanting and weeding. He applied both organic and chemical means (70: 30) for nutrition management of the crop.

In the first year he got a bumper crop of 48 quintal per acre. Since then he never looked back and has been increasing his land under SRI and is now cultivating all his land on the principle of SRI. He is also documenting the entire process at his level and maintains a diary for each crop. He cited that the input cost for paddy cultivation is also decreasing year after year under SRI principle. He is also advising and guiding other farmers in the village to take up SRI. Now, more than 7 farmers in the village are cultivating rice under SRI principle. Some of these farmers are also producing more than L.Dora Baboo. One of these farmers during a telephonic discussion cited that, “*I got the answer* to increasing input cost and decreasing production from L. Dora Baboo.” Now L.Dora Baboo is a ray of hope for the farming community of Orissa.

### (Abstract of L. Dora Baboo's Dairy)

Year/Crop season	Rice Variety	Area(in Acre)	Yield per Acre(in quintals)	Remarks
2004- kharif	MTU-7029	2	48.00	He is applying 5-6 tractor load of compost per Acre. The chemical fertilizer dose is showing a reducing trend. He now applies nearly 60 K.G. of chemical fertilizer per acre on an average. He believes that the yield increases with more number of weeding. So he undertakes weeding operation 4-5 times. He also applies neem oil and cake to protect his field from disease and pest attack.
	MTU-1071	2	44.75	
2005- Summer	MTU-3626	2	39.00	
	MTU1010	2	40.50	
2005- Kharif	MTU-3625	3	42.00	
	MTU-1010	2	39.00	
2006- Summer	MTU-1010	3	54.75	
	NLF-34449	3	45.75	
2006-Kharif	RPH-2	3	45.75	
	MTU-3626	3	30.00	
	MTU-1010	2	50.25	
2007-Summer	Khandagiri	0.5	39.00	
	NLF-34449	0.5	42.00	
	MTU-1010	2	42.75	
	RPH-2	2	50.25	
2007-Kharif	MTU-7029	2	50.25	
	NLF-34449	2	41.25	
	MTU-1010	2	47.25	
	Naveen	1	42.00	
2008-Summer	Naveen	2	41.25	
	MTU-1010	2	45.75	

### **Non-research actors (NRA)**

SRI is very popular among the NGOs working in the sector of natural resource management, sustainable agriculture, organic farming and rural livelihood. It is becoming more and more popular because of various positive aspects. The yield advantage in SRI method over traditional method is more than 100%. It requires less seed, less water, less/no chemical fertilizer, less labour in comparison to traditional method. It also offers benefits like more production and less pest and disease occurrence. It is environment friendly and suitable for small and marginal farmers and share croppers. It is a tool to achieve food security in interior and tribal areas. As it requires less water it can be taken up in summer season in the irrigated areas. Because of the use of organic matter the soil structure and texture changes and it retains moisture for a longer period. Because of smaller requirement of seed, farmers can use good quality of seed ultimately improving the CRR. The seed requirement is just 2kg as compared to 45 kg in the traditional method. This contributes to their family food security even at the time of initiation of the crop cycle.

### **Research actors (RA)**

Researchers feel SRI can increase yield by at least 15-18% with 28-32% less water use. It is environment friendly, sustainable and can preserve biodiversity and indigenous rice varieties. The duration for maturity is less by at least 7-10 days. The crop can withstand against temporary drought for 10-15 days. Soil health improvement like more earthworms has been observed. Not only does the yield increase but also the total factor of production increases. One of the drawbacks of SRI is it needs more labour and is very precision oriented. The organic principle of SRI is not fool proof.

### **Problems encountered by stake holders:**

During our interaction with the different stakeholders in promotion of SRI we found the following constraints:

#### **Farmers level**

Since SRI is a very new technology there are constraints in availability of the implements.

Markers are not available at the farmers' field, so rope is used and this is time consuming. As the lines are not straight enough in rope method the operation of weeder is also restricted. Manual weed management is time consuming, hence it increases the expenditure. In tribal pockets less flexibility in agricultural practices puts pressure on limited family (manual) resources to manage SRI and other agricultural operations. Tribal farmers feel SRI has more initial investment for land leveling and transplanting in comparison to their traditional broad casting method. Non availability of assured irrigation at flowering time hampers the production. As transplanting is not very common in interior pockets it restricts the spread of SRI in the tribal areas. The farmers are not in a position to adopt the six principles of SRI because of the non availability of different inputs and implements. Access to training and exposure for tribal farmers living in interiors is a big question. Non availability of trained resource persons adds to the problem.

#### **NGO**

NGOs shared the need for training in attitudinal change for farmers and other stake holders to adopt new practices for scaling up. Continuous follow up and monitoring is required initially for creating critical awareness on SRI. Access to right type of implements, appropriate skill training on early transplanting and other methods of SRI is required on a war footing basis. Over expectation for scaling up, to reach SRI to a large number of farmers in the first and second year of introduction is a big threat. Irrigation and drainage are serious issues that need to be addressed through policy intervention, technical and financial support.

Resource person on SRI are inadequate in number to address the need of farmers, hence a cadre of SRI facilitators need to be developed quickly for each block and district through regional training centers. Inter and intra districts/state exposure are required to generate awareness and confidence. Capacity building plan of bilateral projects, agriculture department and NGOs need to integrate this. Availability of enough quality compost is a big question mark, due to decrease

in animal population; hence vermicompost and green manuring training and financial support for establishing these units needs to be promoted on a large scale.

Education through mass media and advertising through articles and short films are also required. Saline and water logging condition requires special attention for reclamation and drainage to include SRI or else many such farmers will not have access to the benefits of SRI method. Collaboration of GO and NGO is a must, to scale up to large number of farmers. District level NGO or Lead NGO supporting SRI replication need to be identified and supported with research findings, training inputs for disseminating to other NGOs/CBOs for wider circulation.

**Researchers and government agencies:**

Availability of right type of weeder is a problem as Cono weeder is not suitable for clay soil. Total organic principle of SRI is not fool proof. Lack of access to marker and weeder and no proper development of supply chain is a hindrance for

up scaling. Lack of awareness among potential non-SRI farmers as well as staff of government also adds to the problem. It is more labour intensive in initial year as skilled labourers are not available. More R&D is required for development of implements. There is no flexibility in spacing according to variety, season and soil type.

Research findings do not percolate to RRTTS (Regional research and technology transfer station) and KVKs in time. Scarcity of field level staffs like VAW and AAO and lack of co-ordination among GO and NGOs is a setback for promotion of SRI. It is not feasible in the main rice cultivation season (kharif) in Orissa because of improper drainage facility. Proper nutrition management is not clearly spelled out. SRI is a highly precision oriented method, so it is difficult to manage it at farmers' level. It cannot be grown in low land. It requires controlled irrigation system and is difficult to grow in rain fed condition. Channels for field irrigation and lack of drainage is a big challenge for SRI method of cultivation.

# Images of SRI in Orissa



Backing the policy intervention: Chief Secretary, Government of Orissa, visiting an SRI plot in Ganjam district.



Weeding by weeder is widely accepted by the farmers. Research and development of weeders suitable for different type of soil should be one of the prime thrust of the agriculture engineers



Busy in experimenting germination and root growth of paddy in different condition and nutrition management in his farm house



Vermicompost is one of the source of getting organic manure required for SRI- Women farmers are producing vermin compost from the house hold waste



Innovations in SRI - Showing his modified Seed drill suitable for dry seeding of paddy seeds in rows suitable for the rain fed areas



A bullock drawn puddler used for SRI. It does not disturb the land levelling.



Discussion with the NGOs promoting SRI in Ganjam district during the field visit.



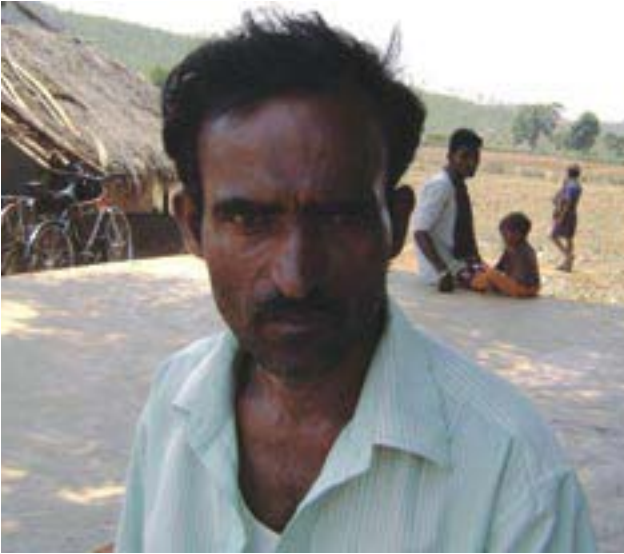
Preparation of vermicompost at the household level. A low cost technique for getting quality compost.



D. Narayan one of the leading farmer in Orissa practicing SRI in his 6 Acres of land since 2005.



Director Agriculture and Food Production demonstrating SRI in his House.



Dibakar Jani-Pioneer of SRI in Koraput district.



SRI needs promotion- Wall painting by Pragati in Koraput – comparison between conventional and SRI method of paddy cultivation.



SRI is more beneficial for the poor farmers for achieving food security.



SRI – A solution for the increased food grain demand due to population growth.



SRI can be promoted through Farmer Field School- Farmers to Farmer spread is the best way of SRI promotion.



Let us beat the drum for spread of SRI in Orissa. Cultural program during a SRI training at Sambhav.



A training session organised by Sambhav for the farmers of Pragati, Koraput.



Pravas Satpathy- (SRI – Pure organic-Variety – IET – 5656, 16 DAS Spacing – 30cm x 30cm 1 seedling/hill)



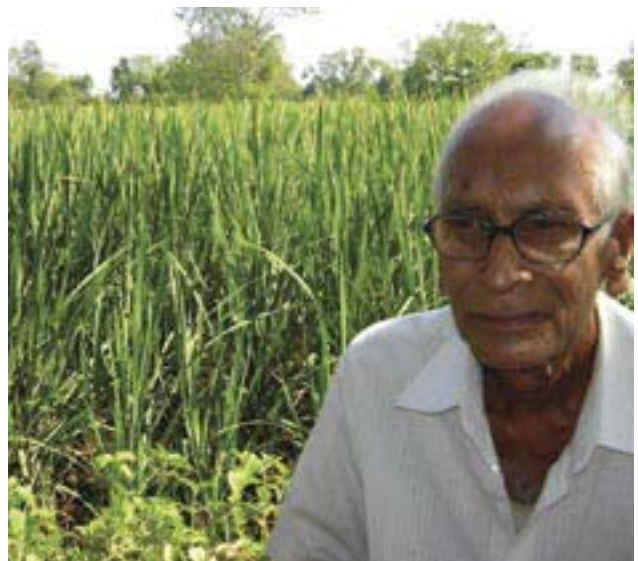
Pravas Satpathy's field View Plot 1 (SRI 50% flowering stage.)



Pravas Satpathy's Field View (SRI Post 100% flowering stage)



Pravas Satpathy (SRI Variety – OR-1898-32-69-Age of seedlings when transplanted 30 DAS; 2 seedlings/hill. Spacing – 25cm x 25cm, Stage – Pre-flowering)



Pravas Satpathy (SRI Variety – OR-1898 – 32- 69- Aged seedling 30 DAS plot in the background)

# My Experiment with SRI

Pravash Ch Satpathy

**Name of the Farmer:** Pravash Chandra Satpathy

**Age:** 80 years

**Village:** Ananda Brundaban Pur, PO: Belam, Dist: Mayurbhanj, Orissa-757024 Mob: 9438169412

**Prime Occupation:** Farming which includes oilseed, pulses, vegetables, fishery, paddy... (SRI, Drum Seedling method, rice-fish system and ratoon cropping of rice)

**Experience:** More than 35 years in farming.  
Total agricultural land: 5.5 hector.  
Extend of paddy land: 3.5 hector.  
Yield obtained in flooding method – 4 to 6 tons/ha.  
Water source: Owns a 10 h.p. river lift point which is at a distance of 1.5 km from the farm.  
Inputs for cultivation: Fertilizers: energized manure, FYM etc.  
Biozyme, Humic solution, Tricontanal, Handi Pani, Vermi compost, Paper sludge, Bacterial fertilizers etc.

## SRI adaptation

In the year 2004 the November issue of the journal India Farming published a special issue on International year of Rice – 2004. The issue carried an article on SRI. And this was my introduction to SRI. After reading I found that I was familiar with such a system. Since 1985, I have been cultivating a bunch variety of local mustard in similar way, transplanting young seedlings on wet bed with wide spacing using only 0.2 to 0.4 kg of seed/ha. and getting

good yield. Now I call it the system of mustard intensification (SMI).

I did not wait for any guidance or demonstration, which was not available. I got the necessary information from the article and just jumped into the band wagon of SRI. I started with rabi-cultivation of paddy in the year 2004. Since then I have been cultivating rice, thrice a year. I started cultivating the SRI way as far as possible in more than one hector area.

In 2005, I visited the experimental plot of CRRRI, Cuttack to get first hand knowledge. I exchanged ideas with the principal scientist in charge of the experiment Dr. P.C. Mohapatra. I visited the plot again the next season but was very sorry to note that they had deviated. They did not pursue even for 2-3 years. They shared about the conclusion with me. One of them, an eminent rice scientist, delivered an inspiring lecture on SRI in the workshop held in May 2007, at Bhubaneswar. I was also an attending farmer. I came in contact with SRI people. I got a presentation copy of - Towards a Learning Alliance – SRI in Orissa. This broadened my thinking.

I use many varieties – to suit my situation and also to explore the potential of newly released and yet to be released varieties.

These are – CR 1008, PNR 162, Kharabela, Gajapati, Pusa-44, Pooja, Pratikshya, F1 Sahyadni, F1 suruchi Salibahan, CR 2033-1, Or-1885-16-32, Ketaki Joha, Kalajira, Udayagiri,

Anjali, CR-24-62-8, Or-2047-3, OR-1878-3, CRM-2203-3 and Mugaisal.

The inputs, spacing adopted, age of seedlings when transplanted and performance of the varieties have been published in the book – Towards a Learning Alliance – SRI in Orissa.

An interesting thing I noted was that a local medium-long duration variety namely Mugaisal gave very good yield, even more yield than a hybrid in one of the SRI plots. I repeated the experiment this year (Kharif 2008) in the same plot and in another plot where some fertilizers have been applied. The only drawback of the variety is that it grows tall and there is high chance of lodging.

### **Seed priming**

As only about 10 kg seed/ha is needed, I first treat the seed in 16% salt solutions to get high density viable seed and wash thoroughly in plain water. The seed is then soaked for four hours in plain water or in 20 ppm sodium chloride or in 20 ppm sodium hydrogen phosphate solution (1gm/50 L water). After shade drying it, followed by sun drying for 2-3 days preferably in the months of October, April-May, the seed is stored for subsequent use. This simple process increases germination percentage, vigour of the seedlings and also kills the fungal spores in the seed coat.

I have not yet given up treating the seeds before sowing with synthetic fungicides. Some fungicides protect the crop for as long as 60 days. After treatment I wash the seeds for further treatments with bio-fertilizers, etc. I am not so sure about cow-urine or handipani (Turmeric water). It has not been verified by scientific investigations or in actual field trials in endemic areas. (Perhaps I might be ignorant about it). Here I may mention that the efficacy of garlic cloves extract has been proved by actual multi location trials in farmers' field to combat fungal diseases of rapeseed – mustard. The soaking of seed in (1% W/V) garlic clove extract for 15 minutes was found to be much more effective than treating with carbendazim or Apron. I have been spraying garlic extract

solution against aphid infestation in mustard crop and found it to be very effective.

At the time of sowing the rice seed in the nursery, I again prime the seed, i.e. soak the seed in some nutrients or growth regulating agents for 8 to 10 hours. Now priming and coating the vegetable and cereal seeds have become a sophisticated knowledge based science, done for different purposes. I read in an article written by eminent scientists that cereal seeds like maize and rice treated with 0.5 ppm 2/4-D or NAA (PPM not mentioned) + azospirillum or Azetobacter can induce profuse root lets, para-nodules and nitrogenous activities. The aim is to induce the cereal plants to behave like legumes which can harness atmospheric nitrogen. Even without 2/4D inoculation, by simply coating the seeds and/or dipping the roots in bio-fertilizer solutions (Azospirillum, Azetobacter, P.S.M) results in enhanced physiological activities culminating in higher bio mass production and grain yield. There is evidence that this simple techniques can contribute up to 25 kg N/ha and enhance yield from 10% to 30 %. So even if we do not have the learning ability to understand the very complex micro-biological process, we should include bio-fertilizers in or schedule of curriculum. This is all the more necessary because quality manure has become costly, preparation of enriched manure is knowledge intensive and preparation of vermicompost and manure preparation requires time, labour, space, resource and infrastructure.

Also we can utilize the beneficial effect of humic substances which is the essence of manure and available at hand. The dense black liquid settled in the bottom of an cow dung manure pit in a trench is a humus solution (humic + fulvic fractions). Also 12% humic solution (Jivarasa, earth etc) is now available in the market. A.C. Gour in his book on Organic Manures have reported thus: Humus (humic + fulvic fractions) when applied to sandy loam alluvial soil @ 0.025 and 0.50% (W/W) increased the yield of paddy crop by 55.7 and 85.4 % respectively.

“Spraying of humus even in small doses (10 ppm) 2 or 3 times during the growth of plants

increased the yield of soybean, moong (green gram) and tomato crops by 23.3, 77.0 and 109.0 % respectively.

“Beneficial effect of humic substances on the growth of nitrogen fixing micro-organisms has been reported. In these studies, it can be observed that the efficiency of Rizobium and Azetobactor inoculants was increased due to application of humic materials. The response to Azetobactor inoculation on wheat crop was 5 percent and due to humate it was 27.7 % and the combined effect (35.4%) was greater than the total of the two.”

Besides this, there is vermiwash which I prepare and use. Also bio gas plant slurry has many beneficial effects. So also does fresh cow dung. Cow urine, especially of pregnant cow has earned reverence of scientists.

Now I am trying to utilize these almost non-monetary inputs in my SRI curricula. I was trained as a laboratory worker, also as a literary worker, which now helps me to do experimental works to record, analyze and write up.

The seed before seedling is soaked in nutrient solutions for 8 to 10 hours and tested for above ground and underground growth in pure sand medium in cut plastic bottles. I found the following dilution effective: 2 4D 0.5 ppm/Azospirillum-aquous solution 2 ml/l/ Azetobacter-aquous solution 2 ml/l/Biozyme-Biovita-2.25%/12%/12% humic solution 2 ml/l liquid manure extract 38%/fresh cow dung: seed – 4:1 V/V/control – plain water. The variety was IET 5656. The nutrients reacted differently. One induced profuse root mass, the other favored root length, while another favoured shoot length in comparison to control. The handipani diluted 100 times (10 ml/l) reacted favorably but when diluted by 20 times (50 ml/l) thickened the ridicule and suppressed growth but after 5-7 days, the roots and shoots growth increased rapidly as if it exploded.

There is many formulations of seed treatments. S. Konokhova from Russia and other research

workers have suggested treating the seed with micro-nutrients which increase root and top development and increase yield. Yield incumbent in treatment with copper, cobalt, iron, magnesium and molybdenum was 0.51 to 0.62 tons/ha, they recommend either to dust on the seed or through slurry @ 30 to 50 mg, 1 kg of seed. This involves practically no expenses.

Thus so much information is available that it becomes difficult and confusing to choose one. But should we choose to be ignorant! At least we have options. Most of it does not contradict organic farming.

## Nursery management

Now for the last two seasons, I am not raising mat seedlings. It requires constant care and attention. If watering is delayed by chance the seedlings might come to irreversible wilting stage. Also it is difficult to keep the mat seedlings in good vigor beyond two weeks time. So I have reverted to the old customary methods. I use ample manure, about 1.5 kg/m<sup>2</sup>, along with bio-fertilizers and micro-nutrients @ 1 to 1.5 gm/m<sup>2</sup> and sometimes basal NPK application @ 20-20-20 kg/ha. Seed is sown densely @ 0.3 to 0.4 kg/m<sup>2</sup>. So about 25 to 30 m<sup>2</sup> nursery area is all that is necessary for 1 ha planting. While uprooting, due care is taken to take out the whole roots without injury. The roots are washed, dipped in biofertilizers and diluted in gobar gas slurry solution for about 30 minutes and carried to the field in trays. In unavoidable situations, the seedlings are kept in the nursery up to 30-35 days after sowing. The older seedlings also make up when planted 2/hill and well managed. Long duration varieties yield as high as 6-8 tons/ha which is more than conventional method.

## Land management/transplanting

I have been growing rice-rice in the same fields for the last 25 years. I use to test the soil once in 3-4 years to know the status of the soil. My field is mostly acidic. The pH remains between 5 to 5.5 to 6, O.C – 5.5 to 6.5%, K – 250 to 350 kg/ha. This year I added paper sludge @ 1 tons/ha. The yield has not been declining over the years. In SRI, at time of favorable situations, I got as high

as a ton/ha, but usually it remains between 5-7 tons/ha. Less yield is due to my incompetence.

Usually I apply good quality FYM, sometimes broiler poultry manure @ 4-5 tons/ha along with up to 50-25-25 kg NPK/ha. But in my pure (organic) SRI plots, I apply FYM @ 10 to 12 tons/ha, at times crop in excess of 20 tons/ha.

I always use slow release N as urea coated with Neem along with 6% gypsum as basal and at maximum tillering phase. Because of slow release of N, plants never show sign of excess N effect. The leaves gradually obtain a deep to deeper hue indicating that further N is not necessary. In one plot, I applied whole of NPK (with coated urea) as basal dose. The plants slowly, gradually utilized the N, did not show excess N effect, did not require further N and came up as good as split application of urea N.

**Making channels in the field:** At first I was making irrigation/draining channels at a distance of 10 – 15 meters. Now I cut channels at a distance of 2-3 meters by means of a wooden country plough, and cross cut at a distance of 10-15 meters. Three bullocks pairs/ha cut the channels and about 10 persons/ha smoothen the ridges of the channels. Thereby I avoid making channels by man-power.

I have no roller marker. It was not available at hand. I also vary the width of the rows and plants. I attach marking points either at 25cm or 30cm to the nylon threads. My workers are trained to transplant as they are told. At the site of the channels they adjust avoiding the bottom line. About 60 to 70 women workers plant a hectare @ 25 hills/m<sup>2</sup> and 40–50 @ 11/hill/m<sup>2</sup>. I prefer 30X30cm space for long duration varieties. Perfect symmetry is maintained so that weeders move unobstructed either way.

## **Water management**

I have my own river lift irrigation point, but it is at a distance of 1.5 km from my farm area. I try to follow the classic model which is not always possible for one reason or other. I allow about 7 days shallow submergence at maximum tillering

stage and then about 10 days, a week after P.1. Stage.

## **Spraying NPK/specialty fertilizers/growth regulating products**

A lot of information is available on the subject. There are experimental evidences that speciality NPK fertilizers/DAP/Urea/micro nutrients/some growth regulating products when sprayed at right concentration at right time improves yield upto even 25 %. Some surely reduce percentage of chaffs, increase the length of the panicles and number of seeds/panicles. Based on research findings I include boron @ 20 ppm and zinc @ 50 ppm in the spray solution at the time of flowering to help translocation from source to sink.

## **Disease and pest problems**

To combat diseases and pests, natural bio-products are greatly favored. One such is diluted (Handi Khata) – earthen pot manure. Neem products are also available. I always keep stock of both and use them as a routine. However, SRI creates adverse environmental condition for pests and diseases to multiply. This year I noticed minor fungi attack. Sometimes the crop is affected by false smut and bacterial leaf blight and also leaf spot. I control false smut spraying copper fungicide and leaf spot with dithan M-45. Bacterial blight is effectively controlled by diluted cow dung slurry (about 20-30 kg/ha) and I use trico-cards for stem borers.

## **Spraying equipment**

Workers are reluctant to carry a load of 16 Kg and spray 500-600 L of solution per ha. I use a battery sprayer instead. Usually 25-30 L of solution is sufficient for one ha. There is no scorching effect even if concentration of solution is increased to 25%.

## **Weed problem: the tools**

Weed control is the major problem. Of course I have cono-weeders and one Mandwa weeder. One model of cono weeder worked well initially but with increased use it developed trouble. The bolts which tighten the cono to the hands, become loose repeatedly while at use. Also the tube handles at the fixing sites gave way forming

holes. So I changed the tube hands and replaced them with two solid iron rod of equal diameter distance. In each rod 4 holes at 1.5 cm distance for width adjustment are drilled to hold tight the fixing bolts. Then the axles of the Kono needed attention. Another model of the Kono-weeder has star wheel at front. I could not find its usefulness. I removed the star wheel and cut short the length by 25 cm. It worked. The width of its float is too narrow. It should be a little wider. I think Cono weeder with carved inward fingers like in the model of Japanese weeder would work more efficiently. Also oil seals might be provided for longer life.

Mandwa Weeder: Its float is too wide and closed at all rides. It becomes a box and gets filled with mud. The problem was solved when the end plate was removed. Also I bent the angular point of the fingers a little to scoop but the weeds at backward movement and press into the mud at forward movement. In the weeders, one male person covers 0.1 ha and a woman about 0.06 ha a day. Weeding is always delayed due to reluctance and shortage of labour. So I am forced to use weedicides. It is a do or die situation. Now I am using one of the new generation weedicides-pyrazo sulfuron methyl @ 20 g au/ha to good effect. When broad leaf weeds appear at a late stage, I use 2 ud @ 0.6 kg al/ha but at 3 weeks of planting.

Adoption: At my place, at the neighboring village, one farmer started SRI last year in a small area. This Kharif, he extended it to 2 ha. The day of SRI would come but a slow pace. Now the Agricultural department has stepped in. Workshops are being held, some incentives given, which means now SRI has been approved and accepted. There is pressure of persuasion, lure of incentives, as it was in the beginning of HYV period. So things will change in favour of SRI. I first received information from the department that farmers in my adjacent four blocks have adopted SRI in 110 acres in this Kharif season (K-08).

### Benefits of SRI

Less seed is required, about 40kg/ha seed is saved. So there will be no short-supply of good seeds.

Crop takes about 7 days less time to mature and consumes less water-almost 40-45% of water is saved. This means almost twice the area may be cultivated with the same quantity of water.

Less nursery area-only 25 to 30 m<sup>2</sup> area/ha is needed. 50 kg of quality manure or 10 kg of vermicompost is sufficient. So cost of inputs is much less. No cost for uprooting in case of mat type seedlings. In conventional but dense sowing system, cost of uprooting is one tenth.

For starters about 60-70 labourers would be required to transplant one ha at 25 hills/m<sup>2</sup> and 40-50 at 11 hills/m<sup>2</sup>, where as twice that number is engaged to uproot, wash, transport and to transplant the same area.

In spite of weeders, at least one hand weeding is necessary. Without weeders, two to three or more hand weeding would be necessary, which would not be cost effective. The field begins to fill almost 60 days after planting.

**Constraints:** As field remains large for ore than 60 days, weeds get a filed day. It comes flash after flash. Summer ploughing and stale led preparations are necessary, but not possible when intervening period between two consecutive (rice) cultivations is very short. Also soil might not get any time to dry. It is really difficult to meet the challenge. I at times feel defeated.

SRI is knowledge based. Farmers usually do not understand the principle. Most follow example and schedule.

### Lessons learnt

In SRI, individual plant counts, whereas in dense planting system, yield depends on performance of community of plants. In SRI, individual panicle is alright rather than large number of panicles/m<sup>2</sup> becoming the winning factor.

SRI is not only a one-root revolution. Water management adds to the effect equally. The rice roots have great regeneration capacity in aerobic condition, so pruned roots wake up surprisingly like that of younger seedlings, the roots continue

to grow till flowering time. So there is scope to manipulate.

If for some reason the mat or nursery seedlings were not planted in time, they may be planted up to 35 days (35 DAS). Mat seedlings cut in narrow strips may be transferred to favorable places and taken care of. Nursery seedlings tend for themselves if managed well for the extra duration. Then even if seedlings get old, they may be planted at hill with same wide distances and cared for in the SRI principle. One may expect 8t/ha yield from highly photo-sensitive varieties viz- CR-1018, CR 1009, CR 1016 etc., but this usually takes extra duration to mature- the extra time it had taken in the nursery.

## **SRI in a different guise**

### **The drum seeding method**

SRI is transplanting young seedling in the wet field, as it is presently understood, I have extended it to line seeding by drum seeder on wet puddle field. I have modified the seeder to drop less seed (up to 16 kg/ha), instead of 60 to 80 kg, widened the rows to cut micro-channels between the lines and simultaneously cover the seedling with a thin layer of mud. In this system all the operations remain the same, but raising the nursery, uprooting and transplanting work are omitted. Two to three workers complete drum sowing of one hectare area instead of 60 to 70 transplants. But then weed problem increases. This system gives more yields in my field than transplanting system whenever I could meet the challenge. It has an edge over transplanting. As I have mentioned, roots can grow in the wet field @ almost 2 cm/day. After 12-15 days of sowing, about 20 cm long roots of seedlings are sure to be damaged in spite of care.

The direct seeding can be useful in remote pockets of Orissa like Koraput, Rayagada, Mayurbhanja, Keonjhar and other places where farming is rain fed. Direct seeding method will be fruitful to overcome the following factors responsible for slow progress of SRI:

- Non-availability of proper irrigation facility.
- Farmers are engaged in various agricultural activities and are not in a position to give extra attention to SRI Field

- They prefer the age old practice of broadcasting
- Lack of knowledge of transplanting
- The initial increase in cost because of land leveling, transplantation poses a hurdle

### **SRI as dry sown rice (DSR)**

SRI could be done easily, efficiently and more profitably in dry leveled field where controlled irrigation is available from sowing onwards. Seed may be sown in lines – 25cm/30 cm apart by single row or multi-rows paddy seed drill. The drill may be modified to drop 3-4 seeds at a place 15-20 cm apart. After germination and within a fortnight weeds may be destroyed comparatively easily engaging less labour by running suitable dry-land hand wheel hoe weeder between the lines. I have the wheel hand hoes with suitable sweeps. I have modified a 3-type seed drill, but could not test for advanced rainy season.

This system was tested successfully though not in SRI concept. I have the valuable experience of sowing paddy seeds on the day I prepared the soil through a funnel and tube attachment to the wheel hand hoe. The seeds were dropped by hand. Weeding was done by the same weeder twice before water accumulated. The crop was entirely rain-fed. As high as 35 tons/ha of paddy was harvested from an indigenous variety with reduced cost.

So SRI could also be extended to dry way of cultivation. It is so convenient and cheap to cut channels at required distances, and if we hoodwink the organic ways, we may broadcast GM seeds (dhanicha, sunhemp, moong, birseem etc.) on the dry soil by planning, sow paddy seeds by the seed drill and irrigating after sowing and at intervals. The GM crop would grow luxuriously. Rice seedlings are not affected by initial competition. After 25 days and within 30 days of sowing, 24D would be sprayed to knock down the GM crop. Later in the GM crop about 10 tons/ha may be incorporated into the soil by suitable weeders. Birseem, Moong crops would die in standing water without 24D. This is called brown manuring. I have once tried the root seeding method, but the GM crop (dhanicha)

did not grow appreciably in the wet field. This is looking beyond.

But nature has not evolved rice to suit to the SRI concept. The concept may be applied to other crops like ginger, turmeric, bunch variety of onion, etc. One of the farmers of my district received the state level award for harvesting 60tons/ha of ginger. He provided more space between the rows and between rhizomes (60 cm x 25 cm). Of course he had applied excess of

fertilizers, lot of manure, oilcakes and vinzyme granules, but he could raise the yield by 2/5 times by providing more space.

This is looking beyond the horizon. You see, I may not be granted enough time to bring my solitary unaided work in a remote village to its logical end. And it is not SRI only which interests me. So if my endeavor and vision leads one anywhere, let him try for himself, I wish him best.

# Scale up Plans and Processes

**S**ystem of Rice Intensification (SRI) is a method of rice cultivation found to be very successful in reducing cost of rice production and increase in yield of rice, hence it is accepted by all sections of farmers (small, marginal to big farmers). Even landless farmers have a scope to learn new techniques of seedling growing, transplanting, weeding and incorporation of weeds in soil as organic compost. Few NGOs/resource agencies are taking a lot of interest to promote SRI, along with few government officials. It can be concluded that all stakeholders are convinced about the effectiveness of SRI. This system is very beneficial to restore the food security of small and marginal farmers. But it requires proper planning to reach to the masses to make agriculture viable and contribute to the state food grain production.

Following is the plan to scale up SRI method of Rice cultivation by different stakeholders.

## Ongoing plan of non-research actors (NGO)

### Increase in overall number of NGOs promoting SRI

By 2006, it was only a handful of NGOs such as PRADAN, SVA, Sambhav, Pragati, and UAA who were experimenting SRI with farmers or organizing training programs for farmers or NGO staff. But there is a significant increase in the number of NGOs promoting SRI from 2006-07 to 2007-08. Promotion of SRI is quietly spreading,

covering almost all districts. Most of the NGO staffs are aware about SRI, although they may or may not be promoting SRI.

### Clear plan to upscale SRI and handholding support to farmers

Some NGOs have a clear plan to scale up and reach more farmers. SVA, Kartabya and PRADAN aim to add more number of farmers to their existing numbers from previous year. CWS has launched a project with 6 implementing Network partners (consisting of 22 CBOs) in six districts for promotion of SRI in the next 3 years so as to cover 355 villages in Orissa by 2010 with financial support of SDTT. This is a systematic approach to reach out to more farmers through project support and monitoring of process. Many other NGOs are also in a process to raise fund for SRI promotion. There is an attempt from the department of agriculture of Orissa to promote SRI all over the state through their different schemes.

### SRI process documentation

It was observed that Kartabya with support of CRRRI, OUAT and Syngenta foundation has come out with a scientific way of maintaining data of SRI practicing farmers. This has helped them convince other farmers and other agencies including Government officials. Similarly SVA, Sambhav and PRADAN have come out with a series of booklet and films on process documentation. To address the need of proper documentation Sambhav had also organized a state level workshop on SRI documentation.

## **Modifying the principles/equipments to suit local condition**

Most of the promoting agencies are trying to modify SRI method based on their experiences. They are also trying their best to modify principles of SRI to suit their local condition. Some of them are trying to develop low cost weeders and markers locally.

## **Organising experience sharing session**

Organising experience sharing sessions is an important way of dissemination of SRI. PRADAN, Sambhav and SVA organize sharing sessions at regular intervals. They also develop audio visual documents for use as training materials and awareness generating tools among farmers.

## **IEC (Information, Communication and Education) material development**

Some agencies (SVA, Pragati, PRADAN, and Sambhav) are trying to develop IEC materials and understand the need of the farmer closely. They have developed leaflets, books, video films on SRI. Some NGOs have developed useful IEC materials which can be used as training or reference materials by promoting agencies.

## **State level coordination on SRI activities**

Xavier Institute of Management, Bhubaneswar (XIMB) has been coordinating and facilitating SRI promotion activities in Orissa from 2006 by publishing books, organizing learning alliance platform, conducting state level workshops for government, non government agencies and farmers of Orissa. Perhaps this is the most significant factor that brings together all stake holders for common understanding.

## **On going plan of non-research actors (GO)**

### **SRI Promotion through policy support and guidance**

Government of Orissa Agriculture department under the dynamic leadership of Director Agriculture, Dr. Arabinda Padhee has created a positive wave by including SRI in NFSM and other schemes. His contribution is quite significant with respect to the impact it has made for policy change and advocacy with the Government of India and

higher levels and creating a suitable policy for promoting farmers to take up SRI in their field. He is also responsible for motivating district officials of the Agriculture department to learn SRI from NGOs and other agencies and implement SRI in their respective districts. Government officials have also participated as stake holders in Orissa State dialogue workshop on SRI along with WWF, Oxfam GB, XIMB and CWS and have carried forward their learning to the field through their line of action like agriculture officers and overseers, VAW network.

## **Sensitization and demonstration program**

The Director Agriculture has taken support of OUAT scientists to organize a series of sensitization program on SRI for district and block level officials. These programs were organized at Image, Bhubaneswar. Subsequently, the Director agreed to support conducting SRI field trials at the farmers fields. In each block 10 demonstrations are being conducted. Each demonstration has a fund allocation of Rs.3000 to Rs. 3500 as shared by different government officials. SRI demonstration has been integrated as a component of NFSM, RKVY and ATMA projects. The current 2008 plan focuses on organizing 3500 Field Level Demonstration in 30 SRI Villages across Orissa.

## **Constraints of up scaling**

### **Technical**

- **Inadequate experience and practical knowledge of farmers:**

In spite of the huge interest shown by farmers, NGOs and government officials, it is a fact that special skills are required for SRI cultivation and to follow its principles. All these practices and methods are new to the traditional rice farmers. Lack of practical knowledge and experience, results in the farmers facing a lot of difficulty in growing rice using SRI method. Training on SRI is being imparted to very few officials at the district and state level, where as village level workers and block officials do not get any opportunity for such training. As a consequence they face a lot of difficulty while communicating about SRI to the farmers.

- **Access to appropriate implements:**

Markers and weeders are the most important implements required by all SRI farmers. Few farmers with support of NGOs and resource agencies have developed indigenous markers made out of bamboo or wood. Also some farmers use rope with knots as a marker. But they are not able to develop weeders by indigenous technique, and depend on market or supply of government system. Only few NGOs have procured weeders in bulk from other states like AP and West Bengal. Some NGOs have requested the government to supply weeders. The need of the hour is to develop a range of weeders since soil type varies from place to place. Access to technology and implements needs to be improved significantly for all sections of farmers to make SRI successful.

- **Non availability of quality compost:**

With declining cattle population, availability of compost has reduced significantly. The wide spread practice of green manuring is also not very popular among farmers. Vermicompost is still a new concept for many farmers and common farmers cannot learn or make it without the support of some NGO or resource agencies or government. Use of weeder for converting weeds as an organic compost material also needs to be explained to many farmers. Combination of all these can solve the problem of non availability of quality and quantity of compost.

- **No Standard POP on nutrition management:**

It is an academic debate how much compost or organic manure is required for producing maximum quantity of SRI Rice. The Sambhav team expressed that organic manure helps to create healthy soil which in turn will enable better production. Sambhav practices this very successfully on its campus. The OUAT scientists are conducting a research study to conclude how much organic manure is required for cultivating one acre of land under SRI. Sambhav, CWS partners and other agencies have already

documented different organic practices which need to be verified and popularized among the farmers. The need is to have a standard package of practices for SRI before promoting SRI at a large scale.

- **Inadequacy of irrigation and drainage facility:**

This is perhaps the most significant challenge farmers face as only 35% of total cultivated area is irrigated in Orissa and the costal plains suffer from water stagnation due to lack of drainage facility. As SRI is a precision farming process, it is not suitable for many farm lands which don't have proper irrigation or drainage facility.

### **Institutional**

- **Limited SRI Resource person at field level:**

In Orissa the numbers of SRI trained persons are very limited, although in the last one year many NGOs have started sending their staff for training programs organized by various resource agencies. But still these numbers are not sufficient. It requires a systemic approach to develop a cadre of SRI trained persons.

- **Weak link between and among GO and NGO:**

Some NGOs have good relation with local agriculture officials and take their help for SRI promotion, while many NGOs work in parallel. Some NGOs like CWS/SDTT project involve all levels of agriculture department in the process, similarly PRADAN, PRAGATI, Kartabya, Harsha Trust are found to have good linkage with their counter part agriculture officials.

- **Inadequate training and exposure visits for farmers and facilitators:**

Training and exposure trips are the success steps for introducing a new technology and building confidence among farmers and NGO workers. Some NGOs and govt. officials have understood this and focus this in their program component, while many farmers and NGOs take up SRI without proper training and exposure resulting in gross failure and blaming the technology.

- **Scarcity of field staffs like VAW and AAO:**

The officers of the Agriculture department do not have sufficient number of field staff (VAW or AAO at the block or district level). This poses a major problem in their proper functioning. And exclusively working on SRI becomes difficult with limited staff.

### **Attitudinal**

- **Negative attitude of few stake holders on SRI:**

Few research scientists of KVK and RRTTS are not happy with the process of promotion of SRI through NGOs. They think it should be tested at the research stations before going to the field. These attitude problems are difficult to remove, and there should be some training programs to bring about attitudinal change.

- **Total organic not feasible:**

Most government officials feel total organic SRI cultivation will have serious impact on yield and

their anxiety is about sourcing large quantities of organic manure. Perhaps more exposure to organic practicing farmers or farms of Sambhav can bring about change in the belief of these government officials.

- **More labour intensive:**

Many government officials feel SRI is a very labour intensive method of rice cultivation, at least in the initial years. However interactions with different stake holders revealed that they found it less labour intensive.

- **POP not scientifically accepted:**

Many scientists shared that 25X25 cm spacing can be recommended without having field trial, but few say it needs to be variety specific. They also shared SRI is not feasible in Kharif season because of water stagnation. Some of them also fear its suitability as it is precision farming and without proper advice on nutrition management, the farmers may not be able to manage it successfully.

# Recommendation of Study Team for Scale up

The following section advocates recommendations for scale up of SRI in Orissa during the next couple of years. These recommendations are based on the observation of field reality and the scale up plan of different stake holders. The study team feels this will provide a road map for SRI scale up in Orissa.

## Practicing Farmers - Pool

SRI needs a large pool of resource persons to facilitate farmers at the field level. It is not possible to hire and train large number of facilitators for SRI promotion. In the course of interactions with different actors it was observed that at least one facilitator is required for a maximum of 100 SRI farmers. So to reach a number of two lakh (200,000) farmers there is a need for nearly two thousand (2,000) facilitators. This indicates that the government will have to think up of promoting a pool of SRI practicing farmers and grooming them as extension workers. Most of the actors also shared that farmer-to-farmer extension system gives excellent outcome in SRI promotion.

The CSOs should also support in identifying successful farmers and in building the pool of SRI practicing farmers at their level.

## Facilitation and dissemination

There should be proper coordination among all the actors promoting SRI in Orissa. The strength of all the actors should be utilised for promoting SRI in the state. The CSOs should also not hesitate to help others working in the same field. It is important that a facilitating organization

(NGO) should be selected for each district to coordinate among the other actors in the district. As we all know that existing extension system of government is not adequate so it could enter into partnership with NGOs/farmers' interest group for smooth operation. The following plan for facilitation and dissemination can be considered:

### State level SRI workshop

State level workshops need to be organised by the agriculture department to share the experiences (success and failure) by the different actors among different government departments, bankers, Donor agencies, NGOs, training and research institutes like CRRI, OUAT, WTCER, IMAGE etc. This will also help in transfer of innovations in SRI at farmer's level.

### Regional/district level workshops

Regional/district level workshops need to be organised by the district lead NGO involving NGOs, district level agriculture officials, RARS, KVKs and farmers to access the impact of different programs for SRI promotion. Status of different actors, problems faced and the solutions to such problems and the successful practices can also be discussed during the workshop. This can also become a platform for creating an intra district resource centre.

### Development of IEC (Information, Education, Communication) material

Audio visual documentaries, leaflets, booklets, posters, wall painting, slogans need to be developed as promotion material. The agriculture

department and some NGOs are in a process of developing few IEC materials (SVA, PRADAN, Pragati, Sambhav, etc.) which need to be brought together for wider dissemination.

### **Advertisement over Mobile, Radio and TV**

Special sessions/talk can be presented in radio and TV for creation of awareness among the farmers. It can also be included in the regular agriculture promotional programs over T.V./radio. A toll free number can be exclusively dedicated as a help line for promotion of SRI.

### **Street play and folk dance and video shows**

Traditional/regional folk dance and street play can also be promoted along with video shows on successful practices to disseminate benefits of SRI and experience of successful farmers. This is the way for creating mass awareness among the farmers.

### **Sensitization of PRI members**

Most of the PRI members are themselves farmers and role models for fellow farmers. They also have very good contact with other farmers. So sensitizing them on SRI method of rice cultivation can be beneficial for spreading the message among farmers.

### **Support and incentive for implements and maintenance of soil health**

The present system of the government of supplying implements to individual farmer at a subsidized rate should be avoided as in several cases these implements are of no use in the subsequent season if the farmers do not practice SRI subsequently. So, there should be a plan for establishing a SRI service center at the village level. One of the farmers should be developed as a service provider to the fellow farmers. He should be supplied with sufficient number of such implements of different types at a subsidized rate. The farmers of the same or nearby village can get these implements from the service provider on hire. This will also ensure the livelihood of the service provider. The service provider can also play an additional role of village level facilitator. There is also a need for more research on these implements.

SRI responds well to organic practice and healthy soil. This in turn reduces the burden on the government of chemical fertilizer subsidy. So, the Government can come out with a plan to give incentives to those who promote green manuring and production of compost.

### **Institutional mechanisms**

SRI has been actively promoted across the state by the NGOs and farmers. The Agriculture department also responds to the initiative by the NGOs. Since it is well known that SRI cannot be treated as any other input centric demonstration, the department should come out with a plan to involve the NGOs in the process of SRI promotion. Lead NGOs should be selected at the district and block level to facilitate the process. The department should be involved in the administrative and research part where as the NGOs should look after the mobilisation, technology transfer, training and exposure aspects.

### **Training and capacity building of key stakeholders**

The following plans can be considered for capacity building of the stakeholders:

#### **Capacity building training at state/regional/district level/community level**

Training institutes of Government and NGO at the state level need to be involved in facilitating SRI training program for staff of NGOs and agriculture department on a regular basis. In these training centers a cadre of trainers can be prepared for imparting training at the district or block level. So focus should be on building the capacity of these trainers. These trainers can then impart training to the farmers at the community level. The agriculture department can also take up SRI in FFS (Farmers field school) model.

#### **Intra and inter district/state exposure**

Exposure trips need to be organized for farmers/ NGO and Government staff on SRI. During such programs both success and failure stories should be included with focus on discussing the reasons for such success and failure. Different practices and innovations by the farmers should

be given priority during exposure. The successful participants of the exposure visits should be treated as trainers for different training programs.

### **Investment and policy support**

5% model of irrigation (discussed in Chapter 4), farm pond and land leveling activities can be integrated as a component of NREGS. Similarly micro planning for water management and water resource development should be adhered to by government line department. There should be proper planning of different Government schemes for SRI promotion. A State level SRI cell should be established to coordinate with farmers, research and non research actors to support policy formulation. A state level task force involving few SRI farmers, facilitating agencies, government department should also be created to evaluate and formulate policy favorable for SRI promotion in Orissa. A periodic news bulletin can be published by the state cell for information and skill building of NGO and government staffs working on SRI promotion. The state cell should recognise the innovative and successful farmers through state/regional forums and extent award of appreciation to them.

### **Research and development on POP, implements**

Research on Nutrition management, varietals trials, water management, seed drum, weeder and marker, and result analysis should be done at regular basis. Steps should be taken for dissemination of this new knowledge to extension and facilitation agencies like NGOs, training institutes, KVKs, etc. for further dissemination to farmers. Result analysis and fine tuning of farmers' indigenous practices through scientific analysis and research should be done and steps should be taken for popularizing these practices.

### **Establishing state level resource centre on SRI**

A state level resource centre on SRI can be set up to coordinate among all the stakeholders. At present XIMB, is doing a lot on coordination among the research and non- research actors. This effort needs to be continued in the future too. The RRC will develop and anchor a pool of practicing farmer-resource persons who will play a major role in the promotion of SRI. It works with the blocks of areas identified for intensive promotion of SRI over a period of 5 years.

# Study Questionnaire

## SRI scoping study in Orissa

### NGO/facilitator Level:

Name of the organisation- **Manav Adhikar Seva Samiti (MASS)**

Address- **Dhanupali, Sambalpur, 768005, Orissa**

Area of operation- **three blocks in Sambalpur and Bargarh districts (for SRI)**

**Ten questions** for knowing NGO's ability to facilitate and suggestion for SRI expansion:

### **A. When and how did you first come to know about SRI?**

We came to know about SRI from publications and websites in 2005. But the first application of the system in our field areas came after a workshop cum training programme held at image, Bhubaneswar in 2007.

### **B. Are you convinced SRI method can bring more production and income to farmer?**

Yes, from the first year experience we are more or less convinced that SRI method can bring more production and income to farmers.

### **C. Where you have started organizing farmers (which village, panchayat, block and district and how many farmers)**

We started disseminating ideas about SRI in the community in April, 2007 through our regular

agriculture meetings with the farmers clubs and disaster mitigation committees, which we have promoted in 17 villages of Paikmal and Jujumura blocks of Bargarh and Sambalpur district respectively.

Last year, seven farmers of six villages took up the SRI on a trial in 2.5 acres.

### **D. Is your number of farmers practicing SRI increasing or decreasing in your operation area?**

Since this is the second year, we can not say about any definite trend in this regard. But the area under SRI and farmers practicing that model has increased five-fold this year.

### **E. Are they getting more yield in comparison to conventional method? How do u measure (more tiller, more panicle, more grain) or 1m x1m crop cutting analysis with a conventional method of cultivation?**

Yes, last year all trial fields reported substantial yield increase compared to traditional system of cultivation.

We believe that tiller count is not always indication of final yield. Thus we do not consider that as indicator of more yields. The same is with panicle length. They are indicative of health of the crop, more than yield indicators. So we count more on grains as that is what ultimately matters to a farmer. We adopt a practice of sample crop cutting in a 10ft x 10 ft area and calculate per acre/per hectare yield on that basis.

***F. Did you organize an experience sharing meeting of SRI farmers with non SRI practicing farmers after crop cutting?***

Yes, that is regular feature of our agriculture meetings and the farmers themselves participate in such meetings. We have also been outsourced by the agriculture department to impart SRI training and motivation.

***G. What are the positive and negative learning of SRI method of rice cultivation by farmers as an NGO?***

**The positives**

- it can contribute to achieving our primary objective of drought mitigation.
- it can contribute to agriculture sovereignty-including seed sovereignty - which we aim, through less expenditure and more income.
- it can fit into bio-agriculture that we preach and strive to practice.
- it can contribute to more water efficiency, which is the core issue to us.

**Other positives are**

- More farmers are coming forward and coverage is increasing.
- farmers trust us when we approach them to adopt a radically different cultivation technology, indicating our two decade old close and affectionate relationship with the community.
- The first year experiences and yields have given us strength to expand SRI to new areas and new farmers.

**The negatives**

- We are mainstreaming the SRI with other projects and initiatives and we do not have a specific project to take care of SRI promotion and practice. This, to some extent, limits the scope to expand.
- Very difficult to motivate farmers to take up large-scale SRI cultivation as the system is radically different from traditional or conventional method of paddy cultivation.
- Weed growth is a problem and farmers need better preparations to control that. Our role

is only limited to that of an encourager as we are not in a position to support them with advanced agriculture equipments.

- Since this concept is very new, an ngo may require financing full or part of the cultivation expenditure to draw a farmer to this cultivation in the initial years. In this regard we are not giving any monetary help. We are only helping them with professional guidance and motivation.
- SRI is suitable in lands where puddling is possible. But as most of the farm lands in our operation areas are rain fed uplands, puddling cultivation is not always feasible or advisable.

***H. What are the constraints in promotion of SRI to a large number of farmers?***

- it is a radically different system than conventional approach. This is the biggest constraint.
- at the initial stages it may require more man power. Man power shortage at the peak cultivation period is a growing problem in agriculture sector these days. Delay in transplantation may void any benefits accruing from SRI.
- big farmers hold most of the agricultural land which are suitable for puddling cultivation and SRI. But they are relatively averse to SRI as that requires more man power. On the other hand small farmers are reluctant to change conventional approach and 'risk' a crop which is sole source of their sustenance and food security for a year.
- modern implements, like marker and weeder etc., are most essential for rapid promotion of SRI. But in these initial years they are in very short supply or not yet developed for large scale supply.
- and finally rain fed cultivation is a major impediment for SRI as a farmer, in such cases, has no control over timing his cultivation.

***I. What would you suggest donor agency or govt. Department should consider for promotion of SRI in your area to a large number of farmers?***

The SRI is a revolution in the making. As its

cultivation will grow, the cost of production and initial labour shortage will reduce drastically. This will surely contribute to more paddy production at a sustainable economical and environmental cost.

This system of cultivation must be vigorously promoted, especially in states like orissa where drought and land degradation have become very big factors that impede agriculture growth and sustainability on which two third of the population directly depend.

Further, the NGOs are the most effective medium to promote this system in a large scale for quick adaptation and transformation. The NGOs have already taken the lead in promoting SRI in Orissa and other parts of the country. Most of the leading NGOs working in the agriculture and natural resources sectors have integrated or mainstreamed SRI into their operations.

The role of the funding agencies and the government should be to provide financial and mechanical support to the NGOs. This assistance will directly percolate to finance part of the expenditure that a farmer incurs (in the initial years only) so that more farmers can be drawn to SRI and the coverage will increase. Besides this, massive campaign is required to popularise the practice among farmers. The funding agencies and the government should also provide support for technology and implements which can be a major force for rapid SRI promotion.

***J. What is your agency's plan for SRI method spreading in your area?***

We have already integrated SRI in our training, motivation and promotion programmes. The farmers are being motivated and encouraged to take up SRI. Thus the number of farmers and areas under SRI is growing. Last year only seven farmers of six villages had adopted SRI in only parts of their holdings. This is the number of villages have increased to 14.

We are encouraging farmers to first go for trial SRI cultivation in a small portion of their possession

(preferable one-third acre) and gain from experiences from there onwards. The trend has been encouraging so far. All farmers those had tried SRI last year have increased areas under SRI this year. About thirty new farmers have adopted trials this year.

Besides this, we have also taken up SRI demonstration in two of the organisation's own fields. Farmers and trainers will be exposed the practice.

MASS's focus will be primarily on the sustainability aspect of SRI. Another focus area is to continuously conduct action research impact of SRI on the soil quality, moisture retention, drought proofing capacities and other environmental benefits.

In the next year we expect to increase SRI coverage, through community motivation and other supports, to 50 villages and 500 households.

In three years, we want to develop ourselves as a SRI resource centre for the districts we are working.

***K. Are you using markers and weeders and from where you have purchased or developed it? Any problem or positive side of using this.***

Yes, we are using markers and weeders. We have facilitated designing and development markers through local improvisations. The weeders have been purchased from agriculture department.

The markers need more improvisation to save time. The weeders are good in controlling weed. But we can not supply weeder to all farmers as we have very few weeders in our field centres.

Thus the government should promote and provide markers and weeders at a subsidised at the block level or panchayat level.

Ranjan K Panda, MASS,  
ranjanpanda@gmail.com

# Questionnaire for the Farmers

## Ten questions to get understanding on SRI from farmer

- a. Does he know SRI technique or is he getting to know about it for first time? Is it a variety or method?
- b. Which are the (new) principles that he has followed with regard to SRI? (How many principles he has followed out of 6 principles)
- c. Did he get any training or visit demonstration site?
- d. Who has trained (NGO/GOVT/any other agency?)
- e. How many acre of area he plans to cultivate for in Kharif 2008 in SRI method?
- f. Why he likes SRI method?
- g. What are problems associated with SRI?
- h. Are other farmers learning from him in his village or out side of his village?
- i. What is average number of panicle, average number of tillers per plant and what is the yield per acre?
- j. What is the amount of expenditure and is he making any profit or not?

# A Story of the Common Farmer in Orissa

We left the hotel in the morning full of enthusiasm to meet some successful farmers in the most advanced agriculture area of Kalahandi district. On the way we stopped at a petty shop and asked the owner for directions to farmer Laxman Nayak a committed SRI Farmer. He showed us the way and asked us the purpose of our visit. We explained about it in brief. He listened to us very keenly and started sharing his experiences related to paddy cultivation. This person was Bimal a young farmer who took up rice cultivation as his secondary livelihood after his father's demise in the year 2004. Earlier his only livelihood was the petty shop in the village. After his father's demise Bimal took up agriculture in addition to his prime occupation. During this time the Indrabati irrigation project was operational which had changed the entire scenario of cropping pattern. Earlier the cropping pattern was paddy-pulse which was replaced

by paddy-paddy. Water was plenty in the area causing water logging a major problem for the farmers. He started farming in this changed situation and was compelled to practice the paddy-paddy cropping pattern. At this time green revolution was at its peak and use of machines and chemical fertilizer was very common. The first year of his venture to agriculture was full of joy and satisfaction. Without any proper knowledge and experience he had harvested a bumper crop. This gave him enough spirit to take up agriculture at par with his prime occupation. The second year gave him a little less harvest but he was satisfied. He was very keen that he should achieve the first year yield or even more than that in the third year. He worked hard and increased the input application like fertilizer, pesticide, weedicide, etc. He also used HYV and hybrid seeds to enhance the production. But contrary to these additional efforts he got even less yield than

**Table-16: Abstract of the expenditure for cultivating 6 acres of rice**

Input	2005	2006	2007	2008
Fertiliser	3250.00	4000.00	4250.00	5500.00
Seed	2700.00	3000.00	3300.00	3600.00
Transplanting	4800.00	4800.00	5400.00	6000.00
Tractor charges for dry tiling and puddling	4500.00	5000.00	5500.00	6000.00
Weeding operation	4300.00	5200.00	6700.00	8500.00
Harvesting	4500.00	5000.00	5500.00	6000.00
Total	24050.00	27000.00	30650.00	35600.00
Yield	64000.00	62700.00	60000.00	35000.00
Gain	39950.00	35700.00	29350.00	-600.00

the second year. He thought that by rectifying some faults in his crop growing practice he would get a better yield. In the fourth year he worked even harder and seriously. Some of the farmers advised him to increase the fertilizer dosage. He heard them and increased the input. But the yield was still less. It was even less than half of the third year. By this time Bimal was seriously indebted. Now he has no other option but to quit agriculture, and repay the loans and other debts from his petty business or else he will have to sell his ancestral land property.

The above figure shows how the input is increasing and the yield is decreasing day by day. It also indicates that the fertility of land too decreasing because of use of chemical fertilizer. Now Bimal is convinced that the traditional method of agriculture can't give him enough any benefit. He is now keen to take up SRI method by experiencing the yield of Laxman Nayak, a neighboring SRI method farmer. He has observed each stage of SRI minutely because of which he is confident enough to be successful using SRI method.





