Status of SRI in India:

Up-scaling Strategy and Global Experience-Sharing

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1. Introduction

India is the world's second largest rice producer, accounting for more than 20% of global production. Input-intensive agriculture practices have helped the country in achieving a quantum jump in food production. However, this production strategy did not benefited millions of small and marginal farmers or some minimally. Actually the strategy itself is no longer contributing as much as before to meeting national food security needs. There is still unacceptable food insecurity for millions of Indian households, and the costs of maintaining the huge current subsidies for fertilizer, power and other inputs as well as price subsidies is a great fiscal burden for the nation.

Under these circumstances, the opportunities offered by the System of Rice Intensification (SRI) and its extensions to crop production in many areas should be considered. They may help in substantially reducing the need for embedded subsidies in every grain of rice while achieving increases in yield by 15% to 40% or more over present conventional methods. In addition to the fertiliser and price subsidies, electricity subsidies for rice production have reached an untenable level. It is estimated that the reductions in water requirement with SRI could reduce per-hectare electrical power demand by about 3,151 kwh, which entails over Rs 12,600 in subsidies.

At present, the productivity effects of SRI management have been demonstrated in 42 countries around the world. In India about 1.7 million farmers are estimated to have adopted the technique on more than 7.5 lakh hectares across 160 districts, with so far no major project funding. Tamil Nadu and Tripura are the leading states for adoption of SRI, but many others are following suit.

2. SRI principles and practices:

SRI operates on the basis of modifying management practices (for plants, soil, water and nutrients) instead of requiring a change in variety (new seeds) or other external inputs. The methods work well with new varieties, but also farmers' present varieties, including indigenous ones; they can be used with chemical fertilizer, but biomass amendments to the soil give best results. With SRI management, crops are usually more resistant to pests and diseases, so chemical protection is less necessary, and IPM protection is most compatible with SRI. The methods were developed for irrigated rice production, but are being extrapolated to upland rice and even other crops. The principles on which SRI is based are well established now by scientific evaluation.

SRI focuses on planting single seedlings instead of multiple seedlings in a clump, and on keeping paddy fields moist instead of flooded during the vegetative growth stages of the rice plant. Transplanting young seedlings (usually 8-10 days old) develop into more vigorous and productive plants, so that with much reduction in plant populations there is increase in grain yield. Wider spacing enables plants to grow more freely, capturing more solar energy and more nutrients from the soil.

Alternate wetting and drying (AWD) results in reduction in the irrigation water application by about 30% to 50%, and reductions in chemical fertilisers and pesticides are beneficial to human health and contribute also to sustainable soil health. Three to four regular weedings are necessity to control weeds, but doing this by conoweeder converts weeds into green manure and improves soil aeration to promote microbial life, both effects enhancing yield, so that the cost of weeding becomes a benefit. Basically, instead of the contribution of indivudual practices, synergy of all these crop care opeations aggregated into more production.

While civil society has played important roles in taking SRI forward, government agencies in Tripura, Tamil Nadu, Orissa, Bihar, Madhya Pradesh and Andhra Pradesh with innovative extension strategies have also advanced the spread of SRI (Appendix III). SRI has become is a "bankable technology" supported by NABARD, as it can enhance farmers' incomes substantially. With systematic planning and upscaling SRI, India has the potential to become a leader in agroecological innovations.

3. Rapid Spread of SRI in Select States

- As a central initiative, NFSM has covered so far nearly 7.5 lakh hectares and non-NFSM under SRI. [to be rewritten]
- The World Bank project (IAMWARM) along with Tamilnadu government activities have promoted SRI to cover 6.5 lakh hectares in 2009; by working with Panchayat Raj Institution (PRI) institutions, the Tripura government achieved a target of 75,976 hectares by 2009-2010
- In its own initiative, NABARD conducted capacity-building training on SRI for as many as 5,068 Farmers Field Schools (FFSs) with 1.52 lakh farmers.
- Through its Jeevika programme, Bihar assisted 19,111 farmers to adopt SRI in 2010 and another 48,251 farmers to take up SWI in a total area of 1,412 acres; the state Government has a plan to cover 3.5 lakh hectares in 2011.
- Through CSO initiatives across the country, 100,000 farmers were using SRI methods on 20,000 ha in 2010. The growth of coverage by several CSO/NGOs is particularly noteworthy:
  - PRADAN started of SRI promotion with 4 farmers in West Bengal in 2003; in 2010, the programme covered eight States, with 39,614 farmers and 3940 ha
  - Similarly, the Peoples' Science Institute (PSI) started SRI promotion in 2006 with 40 farmers, and two years later had reached 13,000 farmers in Uttarakhand and Himachal Pradesh.
- Along with the spread of SRI use it should be noted that CSO programs have focused on assisting small farmers in rainfed and tribal areas so that the benefits come particularly to more vulnerable households living in more marginalized parts of the country.

4. Why is there need for a national SRI consortium?

- A lot is happening in the field on SRI/SCI, which should be known and shared more widely, acquiring and processing information that can be used to improve SRI/SCI initiatives and to inform national-level policies and leaders.
- Despite the enormous spread of SRI/SCI in many states, India may miss the opportunity to become a world leader in agro-ecological innovations if there is no aggregation and refinement of experience.
- Up-scaling of SRI requires working in partnership among a variety of institutions and applying different mechanisms and modalities for extension.
- Stronger research efforts are needed, with focus on priority knowledge needs; currently not all ICAR and agricultural universities are on board, but their cooperation can be strengthened as research agendas are formulated and as results and findings are shared
- Field-level agencies working on SRI need greater support and recognition, sharing materials, methods and learning, particularly among farmers in the different States. In this connection various policy dissemination activities and experience sharing dialogues among the stakeholders are organized from time to time (Appendix II IV).

5. Important conjectures, issues and questions raised

- SRI is an innovation of particular contemporary relevance as it not only increases grain and straw yield but also economizes on precious water. The principles and practices of SRI are also now being applied in cultivation of wheat (SWI), which has showed encouraging increases in output in several states. The methods have also spilled been extended to other crops such as maize, millet, sugarcane, mustard, and rape seed, showing remarkable results with reductions in cost.
- Professor Norman Uphoff stated in the meeting that scientists can help significantly in furthering the promotion of SRI among farmers, having more direct engagement than in the 'linear' model of 'sending' results to the field through an intermediary extension service. The phenomenon of the Government representatives, NGOs and researchers, all sitting together, exchanging ideas and influencing each other, is a remarkable development. This has been the pattern for SRI development in most countries. The promotional activity should be propelled not only by civil society but also by the Government in a partnership mode. Civil society is better understood as being a continuum with government than as entirely separate. Also, farmers should be part of the discussion and extension strategy rather than just be regarded as 'adopters.' Their role in adaptation and innovation has been key.
- The gene-centric scientific research strategy does not contribute to knowledge transfer to farmers and makes no contribution to human resource development. SRI promotion really represents a different approach to management of farming methods in smallholder agriculture like ours. Unfortunately, there is a most among some farmers that SRI is an improved 'variety' rather than an innovative package of practices and careful crop care. The synergy effect among practices properly used is crucial for increased yield.

- SRI has emerged as more valuable now than ever before in the context of increasing climate change. There is more and more need to buffer our crops against the effects of climate change, as suggested by Prof. Uphoff. With SRI, it is possible to mitigate its impact and to protect farmers against the hazards of drought, storms, temperature shifts, etc. by better growth and functioning of roots and by promoting more abundance and diversity of the life in the soil. While SRI can enhance yields and income, its role can be more critical in achieving food security as India needs to be more food secure.
- In addition, India's development depends very much on human resource development. There is a need to enhance farmers' knowledge and empowerment, treating them not just as simple producers to whom 'technology transfer' is targeted. The SRI initiative brings the farming community into a more active and knowledgeable role in agriculture and it can stem the out-migration from the sector which has been highlighted in the national survey of the NSSO, 2010.
- An important aspect of SRI is that it is not dependent on variety, i.e., it works well with modern varieties, and also with indigenous varieties that have in the past not responded to agri-chemical inputs and have thus lost out during the Green Revolution. This can have direct dividend for agricultural R&D in achieving food security at household level as SRI is adaptable and works for many forms of agriculture. The strategy of intensification can also provide a basis for diversification, to raise incomes and provide more year-round security. Small farmers in Cambodia, building more diversified production strategies upon their SRI learning and success, have been able to increase their household incomes, from the same small plot of land, as much as five times. This involves taking land out of staple grain production, as they can now meet household needs with less area, and installing farm ponds and producing fruits and vegetables as well as chickens, fish and other items for better household income and nutrition.
- Prof. Abhijit Sen said that if in a certain area SRI has worked really well, we have to understand the specific characterization of that area, its water management conditions, and what varieties were used—and whether these can be mimicked to larger areas, identifying those conditions and areas where SRI practice can be best introduced. The location-specific success stories need to be understood well in their context
- Based on his international experiences, Prof. Norman Uphoff made the observation that SRI has worked in a great variety of circumstances except where the soil cannot be drained and is waterlogged. SRI results depend on having aerobic soil conditions. SRI methods have given good results in quite varied and difficult conditions -- Afghanistan, Iraq, Mali, almost everywhere except under soil conditions where drainage is an issue. SRI also is amenable to all classes of farmers. The educated, richer farmers can access information on new practices and techniques by themselves. The greater challenge is to reach farmers who are small, marginal, uninformed and isolated. The question really is how to make SRI more accessible. Even if it may not give the highest yields under more adverse conditions, the increases that SRI does achieve for these farmers has the highest benefit in terms of

human well-being. So focusing only on 'best' areas is not necessary or most beneficial for meeting human needs.

- There was a consensus on the great opportunity that SRI/SCI is bringing to increase crop productivity and farm incomes among smallholders. SRI/SCI has shown its ability to increase productivity in a sustainable way, and it is gaining acceptance among farmers, particularly the vulnerable section as seen with programs like BRLPS and MPRLP. There was agreement that public policy should be better informed by ground-level practices and analysis of field-level data.
- The need to develop clearer understanding of the adaptation of SRI principles and practices to various production environments (soil types, varieties, climatic conditions, socio-economic factors and constraints) was highlighted, so that the existing local opportunities can be most productively utilised in a range of conditions. It is required to document the kinds of institutional and environmental settings that have enabled SRI to be effective and efficient, as drivers for promoting wider adoption and impact.
- A strong and well designed institutional framework is needed for up-scaling SRI by involving innovative partnerships among public institutions, financial institutions, civil society organizations, and private sector in a consortium mode. The BRLPS in Bihar and the Orissa Learning Alliance are examples of such upcoming collaborative effort, which have enabled an unprecedented scale of adoption of SRI within a short span of time. More such collaboration is required for acceleration on a wider scale to more areas, more farmers and more crops. After detailed deliberations, the Round Table suggested an innovative cluster strategy for up-scaling which considered workable.
- Farmer participatory local research is encouraged to provide meaningful feedback to technology development.
- Quantitative impacts of SRI should be assessed objectively and evaluated more systematically than in the past. Support systems for sharing, learning, monitoring and evaluation including forums for participation at the district, state and national level was emphasized. Socio-economic evaluation that computes the savings not just on water but on the value of reduced inputs was suggested. Net impacts on household income should be considered, and also any appreciation in the quality and value of soil resources, as an asset with long-term benefit.
- Further, the sustainable adoption and use of SRI and other agro-ecological methods should receive attention.
- There is need for harmonizing the priorities among the Centre and the States. What the Centre thinks as important priority could be quite different at State level. Therefore, flexibility should be given to States, to enable them to implement what they think as right for their State at any point of time. State governments have the potential to catalyze the promotion of SRI; therefore, the need for sensitization is crucial.

- The group suggested that there be a specific recognition and support for SRI in the 12th Five Year Plan formulation. A separate working group for SRI can be constituted for providing realistic and grass-root level information for developing concrete strategies and mechanisms in consultation with concerned government and non-governmental entities.The proposed working group on SRI should develop and suggest mechanisms and guidelines on the matter in close cooperation with the States in question.
- SRI research and evaluation is required to design plans and approaches that are more comprehensive based on a deeper understanding of the biology of ecosystems. The network of socio-economic and technological research based on a consortium approach could provide think-tank support for SRI promotion and for developing implementable monitoring and evaluation mechanisms.
- Concretizing the structure of this consortium (to be called a National Consortium on SRI, or NCS) as a think-tank of SRI to enhance policy advocacy and communication among the stakeholders requires urgent attention and suggestions.
- NABARD highlighted the need for strengthening data base management system of SRI and other aspects of the MIS. The Natural Resource Management Centre (NRMC) operating under NABARD is planning to initiate a mechanism for standardising the MIS for SRI.. The on-farm data and ecology information can provide emprical backing on certain scientific aspects also.

6. Major Challenges and the Way Forward

6.1 National Program/Policy on SRI

- How to get farmers re-oriented towards focusing on 'management' of their rice agro-ecology and away from input-centered preoccupation?
- How to establish SRI labor markets with new skills and contractual wage rates?
- How to reform irrigation systems towards better control at the farmers' level?
- Establishing decentralised manufacturing of SRI implements and custom-hire systems.
- Building cadres of SRI Resource Farmers.
- Mobilising organic matter / resources for improving soil productivity.
- Establishing research back-up / support systems.

6.2 Strategy for SRI in the 12th FYP

- Transform selected areas into sustainable SRI 'hubs' over a period of time.
- Paradigm shift from conventional demonstration approach to an area-focused approach.
- Adopt a cluster-based strategy to address issues of labour markets, knowledge and behavioral changes in farmers, and irrigation reforms. Tipping point will be reached subsequently.

- Changes to be embedded/ habituated into local economies.

6.3 Prerequisites of Scaling up

- Working in a defined area over a period of time,
- At a modest scale to begin with,
- With facilitation from knowledgeable persons, governmental or NGO,
- With adequate backup support structures and policy, and
- Creating large number of farmer -resource persons

6.4 SRI CLUSTERS as Units for Promotion

- Establish SRI clusters in the prioritized rice-growing (admin) Blocks in the country.
- A Cluster of about 100 ha of rice area would be fully transformed to SRI practice with all (or most) of its principles.
- Build the program around identified SRI clusters with an agency that can give sustained facilitation.

6.5 Suggested Phasing of the program in the 12th FYP

Phase 1

- Start block-wise SRI Clusters – initially in blocks where experience exists today and in rainfed areas with some control over irrigation and drainage
- Start gradually in a small way in the rest of the blocks
- Pilot SRI with irrigation system reforms in selected canal irrigated areas.

Phase 2

- Expand to all blocks over time and evaluate a range of varieties for SRI management conditions, to be able to suggest suitable varietal selection
- Emphasis on permanent long-term capacity building facilitation.
- Initiate a larger program on SRI building on the experience from the pilots.

Appendix I:

List of Participants

1	Prof. Norman Uphoff	Cornell University, USA
2	Prof. Abhijit Sen	Planning Commission, New Delhi
3	Dr. V. V. Sadamate	Planning Commission, New Delhi
4	Dr. Swapan Dutta	Indian Council of Agricultural Research, New Delhi
5	Dr. H. S. Gupta	Indian Agricultural Research Institute, New Delhi
6	Dr. Ganesan Balachander	Member, CG Board, Washington, USA
7	Dr. R. Mahendra Kumar	Directorate of Rice Research, Hyderabad
8	Dr. M. C. Diwakar	Directorate of Rice Development, Patna
9	Dr. Amod KumarThakur	Directorate of Water Management, Bhubaneswar
10	Dr. Suresh Pal	Indian Agricultural Research Institute, New Delhi
11	Dr. B. C. Barah	Indian Agricultural Research Institute, New Delhi
12	Dr. Dinesh Kumar	Indian Agricultural Research Institute, New Delhi
13	Dr. Supriya	Indian Agricultural Research Institute, New Delhi
14	Ms. Naina Mittal	Indian Agricultural Research Institute, New Delhi
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16	Ms. Sue Edwards	Institute for Sustainable Dev, USA
17	Dr. Subir Ghosh	NABARD, Ranchi
18	Dr. Raji Gain	NABARD, Kolkata
19	Mr. Suri Babu	NABARD, Mumbai
20	Dr. R. S. Saini	NFSM, Delhi
21	Mr. Soumen Biswas	PRADAN, New Delhi
22	Mr. D. Narendranath	PRADAN, New Delhi
23	Mr. Anil Verma	PRADAN, Patna
24	Dr. Ravi Chopra	People's Science Institute, Dehradun, UK
25	Mr. Debashish Sen	People's Science Institute, Dehradun, UK
26	Dr. Erika Styger	SRI-Rice Center, Cornell University, USA
27	Mr. Sandip Das	The Financial Express, New Delhi
28	Dr. B. J. Pandian	Tamilnadu Agricultural University
29	Dr. T. M. Thyagarajan	Tamilnadu Agricultural University
30	Mr. A. Ravindra	WASSAN, Hyderabad
31	Dr. N. K. Sanghi	WASSAN, Hyderabad
32	Ms. Bhagyalaxmi	WASSAN, Hyderabad
33	Mr. Nemani Chandrasekhar	WASSAN, Hyderabad
34	Prof. Shambu Prasad	Xavier Institute of Management, Bhubaneswar
35	Dr. Amrik Singh	ATMA, Gurdaspur, Punjab

Appendix II: <u>Past efforts on SRI dissemination within India</u>

Nov-06	1st National SRI Symposium at Hyderabad
Oct-07	2nd National Symposium at Agartala
Dec-08	3rd National Symposium at Coimbatore
Feb-09	Meeting on "SRI scaling up - future directions" at ICRISAT, Hyderabad
May-09	Planning Commission consultation at ANGRAU, Hyderabad
Dec-09	Policy workshop on SRI at Delhi, organized by PRADAN and NFSM
Mar-10	Presentation to NABARD and SDTT by SRI expert review team
Apr-10	Proposal discussion by SRI group with NFSM
May-10	Indian participation in SRI meeting in Madagascar, organized by Wageningen University
Jun-10	Proposal submitted by NABARD to NFSM for SRI coverage through NGOs
Jul-10	NRMC holds national conference on SRI
Jul-10	National SWI workshop, Hyderabad; SRI consortium formed
Oct-10	National SRI Consortium meeting, hosed by PRADAN and NCAP
Dec-10	Planning Commission 12th Plan consultation on food security, Hyderabad
Dec-10	National SRI workshop, WWF, Hyderabad
Feb-11	National SCI workshop at Patna, Bihar

Appendix III: <u>Representative listing of SRI actors in India</u>

CSOs	Govt. of Tripura	IWMI
PRADAN, New Delhi, Patna	**SAUs**	IDS
PSI, Dehradun	TNAU, Coimbatore	WUR
CWS , Bhubanswar	**Research**	
SPWD,	DRR Hyderabad	**Private**
AME, Chennai	CRRI, Cuttack	Usha Martin
Bangla Prasari, West Bengal	DWM, Bhubaneswar	Weeder Manu
ASA, Bhopal	**Inclusive groupings**	
AKRSP, Gujrat	AP SRI consortium, Hyderbad	
Govt. Agencies	**Donors**	
NFSM, Govt. of India, New Delhi	NABARD, Mumbai	
IAMWARM (World Bank), Tamilnadu	SDTT, Mumbai	
MPRLP, MP, Jeevika, Bihar	**Other**	
DRD, Patna	CIIFAD	

Appendix IV: Some of the Output Deliverables

1. Two regional Consortium constituted:
    a. Orissa State Alliances
    b. Andhra Pradesh Consortium of SRI

2. Stakeholders dialogues (6), brainstorming seminars (2), roundtable discussion (1), National Conferences (3) organised
3. National Consortium of SRI constituted
4. A number of research paper published
5. Books/Manual/Technical reports on SRI published
6. Consultation of various groups under 12th Five Year Plan of the Govt. of India held
7. Several members of the Consortium are acting as members of various Working Groups appointed by the Govt. of India for the 12th Five Year Plan, 2011
8. Interacting dialogues continue with various national and International SRI researchers and organisations.

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- All Members of the National Consortium of SRI
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- PRADAN provided all logistic support and resources for the roundtable