



Solution Exchange for the Food and Nutrition Security Community Consolidated Reply

Query: Systemic Rice Intensification (SRI) - Experiences

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From Mahtab S.Bamji, Dangoria Charitable Trust, Hyderabad

Posted 15 April 2008

The SRI (System of Rice Intensification) method of rice cultivation is becoming popular in our country. As commonly understood, SRI method seeks to tap the full growth potential of rice plant by early transplantation of seedlings, transplantation in singles with wider spacing, careful management of weed growth, application of minimum water during the vegetative growth period and use of organic manure.

It is also reported that the advantages are many - lesser seed, lesser cost (in terms of fertilizers and pesticides), lesser labour and more harvest and more income as compared to the conventional methods of rice cultivation.

For the past three years, we have been trying to promote SRI method of paddy cultivation in the local area but with limited success. The problem is the need for weeding which is labour intensive, and need for water at the right time that is not always easy. Initially we had thought that labour intensive would be an advantage because it would mean generating more labour days of employment. But this indeed is not the case, since labour has become scarce thanks to the Employment Guarantee Scheme of the government which gives higher wages. Small and marginal farmers are not able to afford such high wages. In monsoon, this method according to the farmers, does not work since the single saplings planted tend to get washed away. There were also some reports suggesting that there are no significant differences between the two cropping systems (www.i-sis.org.uk/RiceWars.php).

In the above context, I would like to learn from the FNS community members

- Success stories and experiences of adopting and popularising SRI method of paddy cultivation
 - Advantages of SRI method and whether it can be universally adopted or is limited to certain agro-climatic conditions and which varieties specifically respond to SRI method of cultivation
 - How can it be made less labour intensive, comparable to the conventional method
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Responses were received, with thanks, from

1. Prabhat Kumar, Asian Institute of Technology, Thailand ([Response 1](#); [Response 2](#); [Response 3](#); [Response 4](#))

2. [B. P. Gangadhara Swamy](#), Christian Children's Fund (CCF), Malavalli ([Response 1](#); [Response 2](#))
3. [Ardhendu S. Chatterjee](#), Development Research Communication and Services Centre (DRCSC), Kolkata
4. [Norman Uphoff](#), Cornell University, New York, United States
5. [K. A. S. Mani](#), Andhra Pradesh Farmers Managed Groundwater System (APFAMGS), Hyderabad
6. [Anupam Paul](#), Agricultural Training Centre (ATC), Fulia, Nadia
7. [V. Palaniappan](#), Centre for Ecology and Research, Thanjavur
8. [Surekha Sule](#), Independent Consultant, Pune
9. [Bimal Biswas](#), Independent Consultant, New Delhi
10. [B. L. Kaul](#), Society for Popularisation of Science, Jammu
11. Bibhu Prasad Mohanty, Bharat Integrated Social Welfare Agency (BISWA), Sambalpur ([Response 1](#); [Response 2](#))
12. [Poonam Pande](#), SUSTAINET Project, German Agency for Technical Cooperation (GTZ), New Delhi
13. [Puspadhar Das](#), Fresh Producers Society, Guwahati
14. [P. K. Thampan](#), Peekay Tree Crops Development Foundation, Kochi
15. [K. V. Peter](#), Kerala Agricultural University, Thrissur
16. [S.C. Prasad](#), Independent Consultant, Ranchi
17. [Dip Banerjee](#), CARMDAKSH, Bilaspur

Further contributions are welcome!

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Summary of Responses

Cultivation of rice is labour and resource intensive, requiring commensurate irrigation facilities. In this context, members discussed the introduction of the System of Rice Intensification (SRI) approach for rice cultivation and shared experiences with the system, elaborating on locale specific strategies and ways to propagate it among farmers.

Respondents explained the origin of SRI stems from the period of severe water scarcity in **Madagascar** in 1982. SRI proved an appropriate cultivation strategy, because it called for reduced external inputs (water, seeds, fertilizer and plant protection chemicals). At the same time, members clarified that although the SRI approach has demonstrated its effectiveness, it is not a universal technology- it is a set of insights, concepts, and principles to be adapted to local conditions. Thus, they stressed the importance of understanding the complete life cycle of the rice plant- its growth and development.

Discussants felt **SRI principles**, if suitably adapted could produce satisfactory yields. The SRI approach requires significantly fewer seeds, but the quality of the seeds must be good, and proper application is necessary. Additionally, since the number of seedlings needed is less, the distance between plants and row-to-row gap is high, helping reduce the transplantation time and labour, and early seeding and transplantation ensure there is enough quality time for growth. The rice seed is also very small, thus the soil only needs to remain moist and not flooded, as is done under the conventional system. Moreover, a puddled field must have perfect leveling so water is uniformly distributed. Members also noted that

weeding is easier to do under SRI, because it does not require heavy fertilizer dosages and that since single plant transplantation is a precise operation, a skilled worker or transplanter needs to do.

Based on their **experiences with SRI**, respondents highlighted various methodologies and issues related to SRI cultivation. They pointed out it requires fewer seeds per unit area as compared to conventional cultivation systems, necessitates early transplantation of seedlings (in 7-17 days), and space between plants ranging from 30 to 50 cm. In addition, the method needs controlled irrigation, manual weeding using simple mechanical weeders, and application of farmyard manure to minimum inorganic dosage. Resulting in earlier harvests (10-12 days before traditional cultivation methods) and higher yields, which they felt is encouraging more farmers to start using SRI. However, members also underlined that farmers need to try the SRI methodology that best suits their farming conditions.

Discussing whether SRI is adaptable to varied agro-ecological conditions, discussants cited an experience from [Nepal](#) where SRI cultivation brought improvements in rice production in areas ranging from nearly sea level to 2,500 meters. At the same time, they mentioned an experience in [West Bengal](#), where farmers used SRI method with 69 folk rice varieties; with varying results and thus considered the difficulty in adopting the approach on all rice varieties and in all agro-climatic locations.

Members agreed that SRI is an innovative method of rice cultivation, but also felt it has limited application prospects, due to the **various constraints associated** with it. Noting that SRI is more suitable for farmers who have limited resources, respondents pointed out its effectiveness is still under consideration on small land holdings. Additionally, production sustainability remains a matter of concern, when water is a limiting factor. They also felt that tillering is a genetic trait and that the success of the SRI approach may be variety specific, with not all rice varieties proving suitable. On the other hand, a few others felt that tillering might not be entirely dependant on genetics, though initial leveling and seedling spacing are critical factors. Spacing for different varieties requires trial and error experimentation in each ecozone and soil type before reaching a decision.

Along with the above, members also saw labour as a critical constraint, since transplanting is not preferred when there are labor shortages. Weed management is another major issue linked to labour availability, especially in winter, when due to low temperatures, preparing the desired aged seedlings becomes a problem. Discussants argued that transplanting very tender saplings was a challenge because if suddenly watered, the seed would wash away. Moreover, ensuring proper levelling of land during preparation, making it into compartments and the difficulty in mobilizing people to transplant 10-day seedlings (because they are used to transplanting 21-day seedlings) were also mentioned as obstacles.

To address the constraints mentioned, respondents listed locale specific **strategies**. In respect to weeding, they suggested alternatives like using a mechanical weeder, which can increase yield up to 1-3 t/ha, or employing a cono weeder or rotary hoe to make weeding easier and save time and labour. Another option is to use post-emergence weedicides, which was done successfully in **Thailand**.

Members mentioned several **national and international experiences** displaying the use of SRI principles in a wide range of agro-ecological conditions. For example, in **Thailand**, a SRI project was successful in addressing weed and water issues by adapting green mulch using mungbeans in an action research mode, in [China](#), SRI is proving popular for its laborsaving concepts and practices. They also listed various examples from India. In [Tripura](#), the success of SRI was able to increase the number of SRI users from less than 1,000 in 2005 to more than 70,000 in 2007. In [Andhra Pradesh](#), project implementors learned SRI was an option favoured by farmers for improving water efficiency, and in tribal, rain fed areas of [Chhattisgarh](#), plots irrigated using the SRI approach received encouraging results. While in Thanjavur district, the rice bowl of **Tamil Nadu**, farmers, took the bold initiative of going for direct seeding, yielding successful results.

Discussants also referred to **research studies** spearheading the scientific work on SRI. Some dealing with the scientific rationale of the SRI method in the context of available rice science literature and others look into the seedling characters grown using SRI and under normal cultivation. Members highlighted one study by IWMI's India programme and the Tamil Nadu Agricultural University that calculated an 8% reduction in the labour required per hectare and showed yield increases in rain fed conditions and areas under irrigation.

Finally, respondents suggested the following ways to promote SRI cultivation appropriately among farmers:

- Encourage the adoption of SRI collectively at community level, beyond individual farmers
- Involve farmers' groups, like Water Users' Associations, in collective decision making and distributing water resources
- Consolidate/share SRI experiments from different regions at grassroots via field days, meetings, etc.
- Educate farmers through demonstrations and awareness generating activities on the principles of SRI
- Fine tune methodology and practices for field-based farmer oriented research to suite local situations

The bottom-line, members felt is that SRI cannot be treated as a 'package of practices,' but as a set of guidelines to be adopted and adapted to local conditions. There is a lot of objective evidence to support the productivity and desirability of SRI, but at the same time, there are many subjective attitudinal factors, which require more study before it can be promoted on a large scale.

Comparative Experiences

Karnataka

SRI Proves Economical and Profitable to Farmers, Raichur District (from [B. P. Gangadhara Swamy](#), *Christian Children's Fund (CCF), Malavalli*)

The paddy crop cultivated by adopting the system of rice intensification (SRI) in the Tungabhadra command area, proved a boon for farmers who often face water shortages. Farmers saw a big improvement in crop conditions after using SRI. They only had to supply water to their crop once a week and just enough to maintain the moisture, had to use very little fertilizer. After 140 days, the crop recorded a yield of over 80 bags (75kg/bag) an acre, with superior quality rice. Read [more](#)

From [Norman Uphoff](#), *Cornell University, New York, United States*

Tripura

Small Landholdings Large Yields, Dukli Block

Thousands of farmers in the state adopted the popular 'less seed, less water, less manure, less pesticide and high yielding' SRI method as a part of the government's approach for boosting rice production. This strategy has benefited farmers; one farmer had six kanis of cultivable land, and experimented with SRI in three kanis in 2007-08 and based on the results plans to use it for remaining land next year. Read [more](#)

West Bengal

SRI Records Highest Yield, Purulia District

PRADAN's experience grounding SRI principle with a large number of farmers was very positive. The farmers who adopted SRI had an average productivity as high as 7.7 tons/hectare in spite of high incidences of disease and pest attacks coupled with dry spell, both during the transplanting and grain-filling stages. Ninety percent the farmers had yields above 5 tons/hectare, which was about 2.5 times the district average. The highest recorded yield was 16 tons/hectare. Read [more](#)

Chhattisgarh

Using SRI in Rain Fed Areas (from [Dip Banerjee](#), CARMDAKSH, Chhattisgarh)

Farmers tried the SRI on one irrigated plot with optimum dose of fertiliser and on producing encouraging yields from 12 to 14 bags they now plan to replicate it in 20 more plots. SRI was used to deal with erratic monsoons and using the 5% model of SRI which helps in keeping the soil moist.

Andhra Pradesh

SRI Approach Proves Water Saver, Gampanapalli Village, Mahaboobnagar District (from [K. A. S. Mani](#), *Andhra Pradesh Farmers Managed Groundwater System (APFAMGS)*, Hyderabad)

A farmer tried the SRI method on 3 acres, however the crop failed because he did not prepare the field properly. On his remaining 2 acres, he strictly followed the SRI principles explained by APFAMGS officials. Under close supervision, growth was encouraging. Using SRI, instead of the traditional rice cultivation method, where irrigation is necessary for 7 hours/day/acre for 4 months, farmers increased yields and reduce water use, because it requires water to be sprinkled for only 3 hours every other day. Read [more](#)

SRI Wins Confidence of Farmers (from *T.N. Anuradha*, *Research Associate*)

The extension services provided by JalaSpandana gained the faith and confidence of farmers, because of the support they provided during nursery bed preparation, transplantation and weeding of paddy crops cultivated using SRI principles. Farmers who adopted the SRI method had between 1 and 70 acres and their yield ranged from 38 bags per acre to 62 bags; however, the yield from fields where the normal paddy method was used, was about 20 to 35 bags. Read [more](#)

International

From [Norman Uphoff](#), Cornell University, New York, United States

Nepal

SRI Gives Higher Yield than Conventional Methods, Motipur Village, Morang District

Shree Narayan Dhama a member of the Motipur Village Development Committee has been growing rice for many years. He tried using SRI principles on 6.5 kathas (2,160 sq.m) of land with Chaite-2 variety seedlings. He sowed a similar field in the conventional way. The SRI field produced 260 kg rice grains per katha while the conventional field only yielded 100 kg/katha. Based on the results, he expanded production to 1.5 hectares using SRI and now his neighbours are also adopting SRI. Read [more](#)

China

SRI - Less Labour Intensive Approach, Zhejiang and Sichuan Provinces

Large farmers quickly adopted SRI methods and many more came forward in favour as they were able to extensively save on the labor cost. This also helped in removing notion about SRI that it is only good for small farmers, and is labor intensive for widespread adoption. Presently, Five million mu (333,333 hectares) and 1.5 million mu (100,000 hectares) is under SRI methods of rice cultivation in one of the most technically 'advanced' townships. Read [more](#)

Mali

SRI vs. Conventional Method of Rice Cultivation, Douegoussou, Timbuktu (from *Prabhat Kumar*, *Asian Institute of Technology*, [response 2](#))

Africare compared SRI method to the conventional rice planting method. Field owners were responsible for managing their fields and Africare staff provided technical advice during the field preparation, transplanting, and crop management. During the test, Africare technical staff and farmers collected data

on crop development and harvest, and villagers volunteered to undertake fieldwork. The results, showed the SRI plot performed better in all yield parameters as compared to the control plot. Read [more](#)

Related Resources

Recommended Documentation

The System of Rice Intensification (SRI): A Challenge for Science and An Opportunity for Farmer Empowerment towards Sustainable Agriculture (from Prabhat Kumar, *Asian Institute of Technology, Thailand*, [response 1](#))

Article; by Abha Mishra, Max Whitten, Jan Willem Ketelaar and V. M. Salokhe; International Journal of Agricultural Sustainability; Earthscan; Permission Required: Yes, priced publication avail by contacting Abha.Mishra@ait.ac.th

Abstract available at <http://www.earthscanjournals.com/ijas/004/ijas0040193.htm>

Looks into SRI as an alternative crop production strategy that is attracting attention by governments, civil society organizations and farmers in Asia and elsewhere

SRI, a Boon for Paddy Farmers (from [B. P. Gangadhara Swamy](#), *Christian Children's Fund (CCF), Malavalli*)

Article; The Hindu; Raichur; 8 April 2005

Available at <http://www.hindu.com/2005/04/08/stories/2005040812510300.htm>

Reports SRI is a boon to farmers, mentioning that farmers who experimented with it found that it is more economical and profitable using the SRI method of paddy cultivation

From [Norman Uphoff](#), *Cornell University, New York, United States*

SRI: Small State, Big Results

Article; by Ratna Bharali Talukdar; India Together; 29 January 2008

Available at <http://www.indiatogether.org/2008/jan/agr-sritrip.htm>

Reports the efforts by Tripura farmers to attain self-sufficiency in the production of food grain using the System of Rice Intensification, which is giving promising results

SRI Success Story in Tripura

Article; by C. Shambu Prasad; Dams, Rivers and People; SANDRP; May-June 2007

Available at http://www.sandrp.in/sri/SRI_The_Tripura_success_story_Shambu_Prasad_July2007.pdf (PDF Size: 88 KB)

Mentions two striking features of SRI in Tripura - scale of operations with large stretches of contiguous plots and strong policy and field support from the Department of Agriculture

Report on 2nd National SRI Symposium

Report; by Norman Uphoff; Cornell University; Agartala; 3-7 October 2007

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040801.doc> (Document Size: 299 KB)

Personal perspective on the symposium provides experiences of SRI across India's 27 states and specifically of experiences in Tripura

Report on Village Visits in Tripura State of India to Assess Progress with SRI

Report; by Norman Uphoff; Cornell University; Agartala; 6-7 October 2007

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040802.doc> (Document Size: 673 KB)

Shares learning's four days of field trips in Tripura following the second all-India SRI symposium hosted by the Tripura state government, SRI has been successfully adopted in the state.

SRI Takes Root in Nepal

Article; by Rajendra Uprety; District Agriculture Development Office; LEISA Magazine; Morang; December 2006

Available at http://www.leisa.info/index.php?url=show-blob-html.tpl&p%5bo_id%5d=87910&p%5ba_id%5d=211&p%5ba_seq%5d=1

Outlines the challenges faced during SRI promotion in Nepal, explaining how with continued efforts and by adjusting certain practices to suit local situations, SRI is becoming popular

Increased Food Grain Production through Rainfed SRI

Report; PRADAN; Purulia; April 2006

Available at <http://ciifad.cornell.edu/sri/countries/india/inpradan406.pdf> (PDF Size: 175 KB)

Reports on the sustained improvements in paddy cultivation and experiences facilitating the adoption by farmers of a SRI package of practices

2007 SRI in Zhejiang and Sichuan Provinces Now Over 1 Million Acres

Article; Victoria Global Vision

Available at <http://victoryglobal.org/project.asp?month=2>

Discusses the increasing success of SRI in various Chinese and Indonesian provinces due to the fact that it is suitable for cold climates, marginal farmers and not very labour intensive

Report on a Visit to India and Bangladesh Regarding SRI Progress

Report; by Norman Uphoff; Cornell University, United States; 17-26 February 2005

Available at <http://ciifad.cornell.edu/sri/countries/india/indiabangtrep205.pdf> (PDF Size: 394 KB)

Report highlights positive aspects of SRI and new ideas and insights on SRI through the experiences of paddy cultivation in various parts of India and other countries

Adapting SRI in Tamil Nadu

Article; by T. M. Thiyagarajan; Rice Research Station/Krishi Vigyan Kendra, Tirur; LEISA Magazine; December 2006

Available at [this link](#)

Shares experiences of farmers employing different principles of SRI - younger seedling, wider spacing, higher yields and incomes, lower cultivation costs, etc.

Practicing New Learning Even After Failure (from *K.A.S. Mani*, APFAMGS, Hyderabad)

Report; Andhra Pradesh Farmers Managed Groundwater Systems Project (APFAMGS); Hyderabad; September 2006

Available at http://www.apfamgs.org/upload/pdf/RE502006_40035.pdf (PDF Size: 1.34 MB)

Page 58 outlines the experience of farmers, whose first attempt with SRI failed, but who then tried again and have been able to save a considerable amount on water when cultivating paddy

From Prabhat Kumar, Asian Institute of Technology, Thailand, [response 2](#)

Performance of System of Rice Intensification and Conventional Rice Cultivation Methods under Punjab Conditions

Article; by Dr. Amrik Singh; Department of Agriculture, Punjab

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040803.doc> (Document Size: 69 KB)

Mentions that System of Rice Intensification produces greater grain yield as compared to conventional methods in Punjab and also results in better utilization of natural resources

New Rice Cultivation Method Proves Useful

Article; by Ekaphone Phouthonesy; Vientiane Times; Laos; 1 April 2008

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040804.pdf> (PDF Size: 258 KB)

Reports on the successful trials conducted in Laos using the SRI method of rice cultivation, which resulted in farmers achieving yields of 6-8 tons per hectare

The System of Rice Intensification (SRI): First Experiences from Timbuktu - Mali

Report; USAID and Africare; 2007-2008

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040805.pdf> (PDF Size: 580 KB)

Covers the field test in the village of Douegoussou, where the SRI method was compared with conventional methods of rice planting

Report on SRI in Purulia District

Report; PRADAN; Purulia; 2007

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040806.pdf> (PDF Size: 64 MB)

Based on their experience promoting SRI for five years, PRADAN reassessed the adoption and extension of SRI Paddy Production in Purulia (West Bengal)

Report on a Visit to China to Review SRI Progress

Report; by Norman Uphoff; CIIFAD; 9-18 August 2007

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040811.doc> (Document Size: 64 KB)

Mentions the SRI methods offer significant advantages to Chinese farmers and the country's natural resources, and explains how the Ministry has designated SRI as a key extension method

Rice Intensification to Cover 7.50 lakh Hectares

Article; The Hindu; Nagapattinam; 20 February 2008

Available at <http://www.thehindu.com/2008/02/20/stories/2008022055940500.htm>

Reports on the decision by the Agriculture Department to bring 7.50 lakh hectares under System of Rice Intensification during the ensuing crop season

4.3 Lakh Hectares Brought under SRI Plan

Article; The Hindu; Salem, Tamil Nadu; 1 January 2008

Available at <http://www.thehindu.com/2008/01/01/stories/2008010153180300.htm>

Reports that a healthy 20% of the state's total paddy coverage area of 21.5 lakh hectares has been brought under the System Rice Intensification (SRI) programme

From T. N. Anuradha, Research Associate

Orissa State Dialogue on System of Rice Intensification (SRI)

Report; Centre for World Solidarity (CWS), Orissa Resource Centre, Bhubaneswar and Xavier Institute of Management; Orissa; 2007

Available at http://www.indiawaterportal.org/data/conf/Orissa_dialogue_report.pdf (PDF Size: 624 KB)

Provides on the extensive research on SRI across India, outlining field level experiences implementing it along with the various constraints, challenges and benefits

System of Rice Intensification in India - Innovation History and Institutional Challenges

Report; by Dr. C. Shambu Prasad; Xavier Institute of Management, Bhubaneswar; WWF Project Dialogue on Water, Food and Environment, Hyderabad; 2006

Available at http://www.wassan.org/sri/documents/Shambu_SRI.pdf (PDF Size: 701 KB)

Looks into the regions' experience with SRI, and compares and contrasts them in order to gather learnings and highlight cross-learning opportunities with SRI in India.

SRI in Large Irrigation Projects in Andhra Pradesh

Report; JalaSpandana, South India Farmers Organisation for Water Management; Bangalore; 2007

Available

at http://www.indiawaterportal.org/tt/agri/case/JalaSpandana_Water%20and%20Livelihoods%20SRI%20bl ack.pdf (PDF Size: 774 KB)

Details the System of Rice Intensification (SRI) method of paddy cultivation carried out in Andhra Pradesh, and highlights different approaches experimented with when using SRI

Recommended Contacts and Experts

Dr. Baharul Majumdar, Senior Agronomist, Department of Agriculture, Tripura (from [Norman Uphoff](#), Cornell University, New York, United States)

State Agricultural Research Station, Agartala, Tripura; imbaharul@yahoo.com

Responsible for the success of SRI in Tripura and has extensively worked on cultivation of paddy using the SRI technique

Recommended Portals and Information Bases

The System of Rice Intensification-SRI, Association Tefy Saina, Antanarivo, Madagascar and the Cornell International Institute for Food, Agriculture and Development, Thailand (from Prabhat Kumar, Asian Institute of Technology, Thailand, [response 1](#))

<http://ciifad.cornell.edu/sri/index.html>

Provides extensive information on SRI from its origin, methodology, advantages, research papers and articles on SRI

System of Rice Intensification (SRI) (from T.N.Anuradha, Research Associate)

ikisan; http://www.ikisan.com/links/ap_ricesri.shtml

Provides basic information on SRI cultivation, including that it requires less water and less money, while giving greater yields and benefiting small and marginal farmers

Responses in Full

Prabhat Kumar, Asian Institute of Technology, Thailand (*response 1*)

Labor is a real issue here in South East Asian rice fields. Transplanting is not preferred in the areas, where labor shortage is acute (like in Central part of Thailand), whereas, also it depends on the season, like in NE Thailand, many farmers would transplant in rainy season rice, whereas in early summer, they would like to go for direct seeding (as water become crucial in dry season).

Now, briefly I would like to summarize the experiences of the AIT, Thailand based research group on SRI. We received a small grant fund from CPWF (Challenge Programme on Water and Food) (Consultative Group of International Agriculture Research - CGIAR) to work with SRI in NE Thailand and the project successfully addressed the weed problems and water conservation issues by adapting to green mulch using mungbeans in an action research mode. The partial results are available at Cornell's SRI webpage (<http://ciifad.cornell.edu/sri/countries/thailand/index.html>). There are research reports and a 5-minute video made by TVE is also available on this site. The final report is available with me and can be made available on request.

Our PhD student, Abha Mishra is undertaking and spearheading the scientific work on SRI. She has published two scientific papers. The first one "The System of Rice Intensification (SRI): a challenge for science, and an opportunity for farmer empowerment towards sustainable agriculture" (<http://www.earthscanjournals.com/ijas/004/ijas0040193.htm>) essentially deals with the scientific rationale of SRI in context of available rice science literature and then proposes a model of high yield. This paper can be also made available upon request to Abha.Mishra@ait.ac.th. The second paper Experimental Agriculture journal (*in press*) deals with the seedling characters grown under SRI and normal conditions etc. In addition to these basic researches, AIT is supporting the local Rice Department in undertaking the scientific validating research to learn the apparent benefits of SRI. Recently we received another research grant from CSO-CGIAR (Civil Society Organization – Consultative Group of International Agriculture Research) to work on aspects of SRI in NE Thailand partnering with

International Water Management Institute (IWMI) and other agencies like local NGOs and Rice Department of Royal Thai Government.

In nutshell, our experiences with SRI and to our farmers have been very satisfactory until date. The challenge that I see in this regard is not copying the ideas and use SRI as technology or an alternative to any available cultivation method, rather need and rational to adapt and adopt the broader principles of SRI in a given locality to reap its full advantages. As Gangadhar pointed out weed management can be achieved within SRI system, there are lots of thought, and practices are available. However, the best can be planned locally only. In Thailand, I have seen farmers even spraying one post-emergence weedicide as option, those who do not have time for hand weeding.

If there is a need to discuss the weed management issues, I will try to gather more information on various weeding devices available for the purpose and let you all know

B. P. Gangadhara Swamy, Christian Children's Fund (CCF), Malavalli (response 1)

In Karnataka, some of the NGOs are promoting SRI through farmers and we are getting mixed responses. Most of the labour is needed during transplantation including marking and at the time of weeding. As said in the query, when we are transplanting very tender saplings, most of the time it would get washed away when we suddenly irrigate it after 1-2 days, hence it is necessary do the proper levelling of land during preparation and make the land into compartments based on the thumb rule. Checking proper drying of soil before irrigating it is important.

For weeding coner is the best one, hand operated small device used in weeding, it is a wheel fitted with blade and a handle. A single man can push this in between rows to remove the weeds. But anyhow it being a new practice, try to make some changes according to field conditions. It is always good in the upper land. It has become inevitable for us to promote this method due to increasing scarcity of water

Ardhendu S. Chatterjee, Development Research Communication and Services Centre (DRCSC), Kolkata

I have not directly practiced SRI but have read extensively on it, and have interacted with farmers and NGO workers in India and Cambodia.

The SRI approach is appropriate in areas where water is scarce, and where irrigation (water level) can be controlled. Initial leveling and seedling spacing are critical factors. Spacing for different varieties have to be established for each ecozone and soil type by trial and error.

In Pondicherry, The Pondicherry Science Forum and in Chhattisgarh Jacob Nellithanam, have reported very good results.

For lowland paddy research into rice-fish-azolla-duck kind of integrated system is likely to be more productive and remunerative; though it needs some initial investment. This is what we have tried in West Bengal.

Norman Uphoff, Cornell University, New York, United States

Prabhat Kumar at AIT has shared with me some recent communications on SRI, and I would like to add some thoughts to the discussion in response to Bamji's queries.

Regarding success stories, the most evident one is in Tripura state of India, where thanks to the leadership of an agricultural scientist in the DOA, Dr. Baharul Majumdar (imbaharul@yahoo.com) there

has been very rapid spread in the past several years. Baharul first learned about SRI in 2000, and the first report he had on it, a many-times photocopied paper, was so faint he said that he had to take a pencil to write in some of the words to understand it.

Baharul spent two years trying out the methods himself, because he was understandably skeptical at the beginning. He also had to work out some adaptations for the very humid conditions of Tripura state (average rainfall is 2500 mm), particularly placement of drainage channels across the length of the field every 8 or 9 rows. In 2002, he got 44 farmers to try the method and by 2005 had raised this number to 880.

At this point, he had both confidence and evidence, and got the Secretary of Agriculture, and then the Minister of Agriculture, and finally the Chief Minister all to come see SRI fields and talk with SRI farmers themselves. This persuaded the political leadership (which had made a pledge to make Tripura self-sufficient in grains, which means mostly rice, by 2010, without any good way to achieve this goal -- five years of trying conventional Green Revolution technologies had made hardly a dent in the rice deficit) to give SRI support.

Baharul was given one-third of the state's agricultural budget for 2005-2006, and by great personal efforts, and with cooperation of DOA staff and particularly PR institutions, the number of SRI users went from <1,000 to >30,000 in one year, and up to >70,000 the next year (2007). At this point, WWF sent a delegation from AP and other states to visit Tripura, to understand what was going on, and it then organized the 2nd National SRI Symposium in Agartala in October 2007. I was fortunate to be able to attend, and attached is report of the symposium (<http://www.solutionexchange-un.net.in/food/cr/res15040801.doc>) and then of the village visits (<http://www.solutionexchange-un.net.in/food/cr/res15040802.doc>) . This will give everyone a good idea of the SRI experience across India (27 states or territories were represented among the 250+ participants) and specifically within Tripura.

The question of whether SRI can be 'universally adopted' is the wrong question, since SRI is not a technology to be adopted (transferred), but rather a set of insights, concepts and principles to be adapted to local conditions. Kumar expressed this very well in his response. But we see wide variation in the agro ecological conditions to which these principles can be adapted. In Nepal, SRI has made improvements in rice production from almost sea level in the terai (Morang district), with doubled yield, up to 2,500 meters around Humla, with sufficient improvement (and cost reduction) to interest farmers. (Under adverse conditions, one won't get the same kind of response.)

Moreover, we see great variation in response to rainfall conditions. Separately, I will send a report from Mali, from the Timbuktu region on the edge of the Sahara Desert, where they got a 9 t/ha yield in their first evaluation last year -- completely the opposition environment from rain-saturated Tripura state. Laos is more like Tripura, and I will attach a recent article from there showing a doubled yield. I recently received a report from the team of PRADAN, an excellent NGO, working in Purulia district of West Bengal, where there is little irrigation for very poor communities. There, starting with just 4 farmers in 2003, the number has grown to over 3,000, with average yield over 7 t/ha -- rain fed. Or see the results obtained in three years of evaluations in the Punjab, where the problem is a rapidly falling water table that will lead to the demise of irrigated agriculture in central Punjab soon at present rates of extraction.

The question was raised about labor-intensity. It is interesting that in China, where there are over 100,000 ha of SRI rice this past season in both Sichuan and Zhejiang provinces, up from maybe 20,000 ha in each two years before, the main reason farmers give for taking up SRI concepts and practices is -- labor-saving. Chinese farmers, being imaginative and industrious, have taken the ideas and figured out how to reduce labor requirements -- along with seed, water and cash requirements.

Studies by IWMI's India programme and by TNAU in 2004 both calculated an 8% reduction in labor required per hectare, with increases in yield, the first study being of rainfed SRI (Purulia district) and the latter of irrigated SRI (Tamiraparani basin). So SRI is more labor-intensive for many farmers, and in the first season while there is a learning process going on it will usually require more labor. But most farmers, some very quickly, convert the 80-90% reduction in plant population into a plus for saving labor.

With no flooding, there is need for weed control. And it amazes me that some farmers find the cono weeder or rotary hoe a godsend, saying saves them time and makes weeding much easier on the body, and others complain bitterly about what a chore the weeding is. I don't know how to assess this. Weeding is a task that practically no farmers enjoy, but we have evidence that good (soil-aerating) weeding with a mechanical weeder can add 1, 2, even 3 t/ha to yield, making this investment of labor very paying.

So, the bottom line I come up with is that SRI has a lot of objective evidence to support its productivity and desirability, but there is a huge subjective, attitudinal factor, which deserves more study. Maybe with the expanding use of SRI in Tripura, this would be a good place for people from many parts of India to visit and learn from this experience, working mostly with farmers that are not very well educated, and poorer, many of the SC or ST households.

When Baharul showed his pictures from the first SRI national symposium, held in Hyderabad in 2006, one could almost hear sighs of amazement when participants saw the beautiful, orderly and productive fields of rice being grown by tribal farmers with SRI methods, some farmers who were not even doing row planting two years before, now managing large, well laid-out and prosperous fields. People from AP who had been complaining about how difficult SRI was for their farmers had to rethink their pessimism when they saw what Tripura counterparts were accomplishing.

So, SRI is a very human innovation and a very human story. I am glad to know that there is so much interest and so much conversation going on. In Tamil Nadu, they are up to 4.3 lakhs of SRI this season according to the Minister of Agriculture. Why other states in India are so lagging behind Tripura and Tamilnadu is itself a very interesting question, which Indians can answer better than me.

B. P. Gangadhara Swamy, Christian Children's Fund (CCF), Malavalli (*response 2*)

SRI is a technology to address water management in paddy. We should keep some more aspects in mind:

1. Instead of working with individual farmers, it is better to work with farmers' group like Water Users group/Associations. In some areas of Maharashtra, farmers are deciding the amount of water required for irrigation on volumetric basis based on area, season and crops. By this method even the tail end farmers also getting sufficient water for their crops. They utilize the remaining water of their quota for next season.
2. Even some WUAs are taking the responsibilities of tax collection and canal repair etc. They are getting required support from respective CADA (Command Area Development Authority) and WALMI (Water and Land Management Institute)
3. When we are working with so many different farmers in different conditions it helps us to know about the variations, which resulted in better yields. The results can be consolidated and shared by conducting field days and in farmers meeting. Some times these groups may work as Krishi Prayog Parivar (KPP), which are so popular in Maharashtra
4. Some Dry land/Up land paddy varieties are available in Karnataka; these varieties can be used in more rainfall areas and in tail end areas. The yield is between 12-15 quintals/ acre.
5. Hence, it is better to follow a holistic approach to address water management in irrigated crops; SRI is one among them

SOPPECOM (<http://www.soppecom.org/focus.htm>) is a research NGO, based at Pune is exclusively working on water management and they have published several books on different aspects of water management

K. A. S. Mani, Andhra Pradesh Farmers Managed Groundwater System (APFAMGS), Hyderabad

SRI technology when adopted as part of a strategy for reducing external inputs (water, seeds, fertilizer, and plant protection chemicals) then its relevance can be well appreciated.

Andhra Pradesh Farmers Managed Groundwater System (APFAMGS) project has been working in hydrological units showing large decline in groundwater levels. In these areas as part of efforts in improving crop water, efficiency SRI paddy is one option that has found favour of some farmers.

SRI paddy is well suited for farmers with limited external resources while family labour is easily accessible (50% more man-days for transplanting and weeding). Growing SRI paddy calls for certain new skills, certain implements that is a deterrent to a beginner.

The greatest benefit is a 50-60% reduction in water application, reduced crop duration of 10 days, lesser chemical inputs, higher yields, contributes to soil health through biological activity.

Farmers who adopted SRI paddy have shown individual excellence but collectively the adoption has been less than encouraging on a Hydrological unit level. It is clear that SRI Paddy's main stumbling block is due to mechanization that has taken over paddy cultivation in large parts of India.

Can SRI paddy find universal adoption, probably not, but can it come to the aid farmers in resource poor environment, surely yes if it is targeted to resource poor farmers with small land holdings having adequate family labour.

Anupam Paul, Agricultural Training Centre (ATC), Fulia, Nadia, West Benga

Your queries are very pertinent. What I found is that it cannot be applied for all the varieties and in all agro-climatic-locations. I have applied SRI method during khariff for all the 69 folk rice varieties and one HYV in ATC Fulia, Nadia; it is the only state run organic farm since 2002. What we say is -transplant 17-day-old seedling with wide spacing. Water holding capacity of the field is very low and spacing was 1 feet apart-line to line and row to row. Pre khariff folk varieties and some khariff varieties did not give more than 15 tillers.

Even Nagaland Special (folk rice from Nagaland) having the potential giving 170 tillers, gave only 35 tillers on an average. HYV gave (Mtu 7029) only 17 tillers whereas all other varieties gave good no of tillers-ranging from 25 to 75. One Chunchura Boro variety gave an average tiller of 90 but without filled grains. One hill of Kankri having 75 tillers gave 224 grams of paddy. It seems that all the varieties with same seedling age may not give profuse tillers. But folk varieties can give more tillers. It cannot be concluded that greater number of tillers is associated with chaffiness. There may be some exceptions. And it may be applicable for HYVs.

Is there any difference of seedling age? Whether 15-day-old seedling give more tillers or 18 day old? Variety wise study is to be undertaken. However, we are doing research along with this line. Owing to wide spacing and comparatively dry soil associated plants (what is called weed) grow very well. We gave two inter culture later associated plants were allowed to grow and did not gave any shade to rice plants. Growth was profuse without any significant attack of insect pest and disease. We do not have to spray

any chemicals or use any fertilizers for growing rice. It saves seed, 6kg seed of ordinary rice and 3.6 of scented rice is needed for an acre of land. It saves water during boro season. It gives higher yield.

One thing I must point out that in some parts of West Bengal deep-water boro (Winter season) paddy is practiced. We boast of deep water Aman paddy but it is a quite different practice. Single seedling-(1.5 feet tall) is transplanted in knee-deep water with a spacing of 1foot in February after transplanting the seedling twice, i.e. double transplanting to keep pace with the receding water. It gave 65 tillers on an average.

In this wet land, they get 18-quintal rice and more than 3 quintal of fish. And that too without any chemicals and interculture. It is being practised since time immemorial. Farmers are not aware of SRI. Mainstream agriculture does not bother about the proven and time tested regional agricultural practices. We do not explore our potentials for increasing production.

Prabhat Kumar, Asian Institute of Technology, Thailand (*response 2*)

I am pleased to read the very interesting views posted by [Mani](#) and then by [Anupam](#). We should not treat it as 'package of practice' approach (which is very deep rooted in post green revolution research-extension) rather as a set of guidelines that needs to be adopted and adapted to the local conditions (both biological and social).

For the seedling age, I am happy to share that there is a publication available in Experimental Agriculture looking into the details of seedling age (for details please contact Abha.Mishra@ait.ac.th, who is the lead author). The fundamental point in this regard is that transplanting should be done when the own food source (autotroph) of seed exhausts and seedling switches to begin photosynthesis (Heterotroph). In many cases, farmers use two leaf stages as indication of this. In cooler areas, this stage will come later, whereas in tropical condition like Thailand, 12 days is right age.

Similarly, Mani experienced a 10-day advance in harvesting and in our case (working with a Glutinous Rice RD-6, Photo sensitive and 6 month growth duration) the harvesting delayed for 12 days compared to the normal. And, clearly these traditional varieties responded well to the SRI management. Similarly, wider spacing of 30 x 30 cm was not found optimal for poor sandy soil types of NE Thailand and 25x25 gave highest yield. For Thai farmers, the labor cost is major cost and many farmers are shifting to the broadcasted conditions. I am sharing some photographs (<http://www.solutionexchange-un.net.in/food/cr/res15040807.pdf>) from our field experiments, to share the ingenuity of farmers in adopting SRI principles to the broadcasted Rice and some other photographs that I took working with the group since last 2 years in the field.

Once again, I agree with [Gangadhara Swamy](#) that SRI also contributes to the water economy. In our two-year action research with farmers in NE Thailand, SRI plots consumed almost 1/3rd less water. However, there are lots of other benefits farmers achieved like almost no lodging of the rice plants, less stem borer damage.

Many thanks to the moderators for posting in-depth reply from Norman Uphoff, Norman also sent along publications that are very useful references

Performance of System of Rice Intensification and Conventional Rice Cultivation Methods under Punjab Conditions

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040803.doc> (Size: 69 KB)

New Rice Cultivation Method Proves Useful, Laos

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040804.pdf> (Size: 258 KB)

The System of Rice Intensification (SRI) – First Experiences from Timbuktu - Mali

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040805.pdf> (Size: 580 KB)

Report on SRI in Purulia District, West Bengal, Kharif season 2007

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040806.pdf> (Size: 64 KB)

Report on a Visit to China to Review SRI Progress, Norman Uphoff

Available at <http://www.solutionexchange-un.net.in/food/cr/res15040811.doc> (Size: 64 KB)

Rice Intensification to Cover 7.50 lakh Hectares, The Hindu

Available at <http://www.thehindu.com/2008/02/20/stories/2008022055940500.htm>

4.3 lakh hectares brought under SRI plan

Available at <http://www.thehindu.com/2008/01/01/stories/2008010153180300.htm>

Primarily I am an Entomologist and would like to request members any experiences on effect of SRI management practices on insect-pest damage / arthropod diversity in rice crop.

V. Palaniappan, Centre for Ecology and Research, Thanjavur

SRI born out of necessity in a tiny place is drawing the attention of the entire rice-growing nation. As everybody will accept, SRI is not a technology to be adopted but a set of insight, concept and principals to be adopted and modified according to local conditions.

Water scarcity was there in madagasker in 1982 and this led to SRI by an innovative father who is also an agri-graduate. Similar situation existed in Thanjavur district of Tamil Nadu in south India. The rice bowel was fed by River Cauvery. But in 1987 water was not released in Cauvery till November which ought to have been released in June. The Farmers were sitting with their fingers crossed. No body either the Government or the university came with an alternative suggestion for the farmers. However, based on the experience of few farmers in 1977 a handful of agriculture officers took bold initiative to guide the farmers to go in for direct seeding instead of raising seedling and planting. This was not heard of in this district so far. The entire Extension machinery and the media like All India Radio gave wide publicity and made it successful but for this technology, the district farmers would have gone with begging hands.

The success of this programe lies with few principles of SRI - early seedling shallow planting leading to profuse tillering, having only effective tillers and discarding the non effective tillers so that we will have more number of grains with a good weight. Based on this experience Farmers are convinced of SRI and few NGOs have taken it up on a large scale even before the Department and the university has popularised it.

It is interesting to note that lot of Research is going on in Farmers Field. One farmer in this district has planted one acre of land with seedlings from half a kilo of seed while the recommendation is 2 to 3 Kg per acre under SRI method. Lot of Farmers are modifying this method to suite their condition to reduce labour and control weed.

What is needed is a drive as that of our direct seeding work to popularise this method and lot of field base farmer oriented research needs to fine tune the technology

Surekha Sule, Independent Consultant, New Delhi

The IWMI-Tata Water Policy Programme (ITP) launched jointly by International Water Management Institute (IWMI), Colombo and Sir Ratan Tata Trust, Mumbai holds Annual Partners' Meet every year. At

its Fourth Meet in February 2005 at Anand, Gujarat, a special session was on System of Rice Intensification. Developed first in Madagascar, the System of Rice Intensification claims that it reduces water use in rice cultivation by 25-50 per cent and raises rice yields by 25-100 per cent but according to some scientists 3-4 fold too.

ITP partner PRADAN got hundreds of farmers in Purulia, West Bengal to experiment with SRI with encouraging results for two successive years. [Norman Uphoff](#) SRI's best-known protagonist led the discussion on SRI with several Indian scientists sharing their research results and experiences with SRI. Ofcourse, Jacob Nellinathan was one of the participants and has much more to tell about grassroots experience.

Prabhat Kumar, Asian Institute of Technology, Thailand (response 3)

Contrary to what [K. V. Peter](#) said 'In a developing country like ours where land holding is small, utility and effectiveness of SRI are questioned', I believe that SRI is more suitable for those farmers who have limited resource and those who are less able to manage the high input intensive agricultural practices. Moreover, that tillering is a genetic traits etc. but its not all genetics, it's 'G x E' not 'G' alone that determines the tillering abilities and other growth and development abilities. 'E' often plays equal if not more role in determining overall performance of a genotype and SRI thought synergistic effects of various factors maximizes it.

Similarly, [S. C. Prasad](#) suggestions are interesting and in line with SRI philosophy that supports the adaptation and adoption of principles based on local resource. I hope S C Prasad will test these ideas and add to the overall knowledge kitty of the SRI for a given location.

Bimal Biswas, Independent Consultant, New Delhi

Management aspect is most critical in SRI. Now a days labour availability particularly during rice transplanting season is a serious problem. Labour productivity is another important issue. In view of these, adoption of SRI by the farmers is a big question. Mr Paul has conducted some trials in Nadia, West Bengal and some such trials are expected too be conducted in future too in other districts because fund is available.

West Bengal is number one in vegetable production in the country and vegetable are cultivated in up and medium land, which is also suitable for SRI. Vegetable cultivation needs better management and is also more profitable than rice cultivation. This is why SRI is unlikely to be adopted in rainy season.

In winter season due to low temperature, to prepare the desired aged seedlings would be a serious problem. In other NE states, even the trials have yet to start

B. L. Kaul, Society for Popularisation of Science, Jammu

I quite appreciate the views expressed by participants for need to increase rice production, which is declining the world over (as per reports coming in the media). The current rise in prices of essential commodities including rice is unbearable for even the middle class not to speak of the poor and those living the below poverty line. Cultivation of rice is not only labour intensive but also requires irrigation facilities. Water is becoming scarce with every passing day and so for the sake of food security we have to lay stress on alternate sources of carbohydrates.

In 1947, 48, 49 and 50 Jammu and Kashmir was extremely short of food grains especially rice. The G.O.I imported rice for Jammu and Kashmir and other states facing shortage of food grains especially rice from Burma. During this period of food shortage, people took to cultivation of potatoes and pulses in the

State of J&K to overcome hunger. Potatoes are easy to cultivate, require minimum moisture, are quite productive and nutritious. There is a bias against potatoes that they add to obesity. This is not true. They are cheap to buy and can be taken in combination with all sorts of vegetables and cereals. Potatoes are the answer to declining food grain production and should be grown on a large scale on all sorts of cultivable soils.

I am not suggesting to replace rice and other cereals by potatoes. The efforts to intensify production of rice and other cereals should continue but potatoes need to be grown on a war footing to overcome the crisis towards which the developing world is progressively moving.

Sharing of similar experiences in this regard would be welcome and indeed helpful in achieving food security or should I say Food for All

Bibhu Prasad Mohanty, Bharat Integrated Social Welfare Agency (BISWA), Sambalpur
(response 1)

SRI is a very scientific method, which has got great relevance to looming hunger problems in India. My experience goes with rice landraces of Jeypore tract as follows.

- In SRI, there is very less quantity Seed but it requires best seeds. Therefore, quality seed production and application is a must in SRI method.
 - Number of seedling is less so the distance between plants is high (50cm X 50cm) and similarly the row-to-row gap is also high. It reduces the time of transplantation and labour cost too
 - Early seeding and transplantation ensures quality time for growth.
 - A rice plant is a very small plant and requires only soil to remain moist. Therefore, it does not require flooded irrigation.
 - Weeding is very easy and beneficial for the soil in this method.
 - People do not need to go for heavy fertiliser dosages. As the plant gets more space and better care it requires FYM, which is usually available with farmers.
 - Small and marginal farmers find it easy, economic and manageable at family level. It helps them to devote more time in labour work in other's field and earn wages in agricultural seasons.
 - Women farm labourers those who are usually used for transplantation and weeding find this is very much scientific, adoptable and easy but reduces labour days. Here an economic implication is observed.
 - This method can also be followed in spirit in other crops. This observation came from a few farmers. They used the science for tomato, brinjal and maize in their backyard.
 - Some of the rice varieties mostly landraces are not positively responding to the process. We believe the production potentiality of those landraces might have reached the optimal status. We also apprehend there may be some other process we are missing to improve the production of these landraces. We are still on job.
-

Poonam Pande, SUSTAINET Project, German Agency for Technical Cooperation (GTZ), New Delhi

I would like to contribute on the SRI system. In the year 2006, I attended a conference on Climate change in Malaysia and there was presentation on SRI. I just wanted to present the comparative data on SRI method and conventional system as presented by Kustiwa Adinata, Indonesian IPM Farmers Association (IPPHTI)

According to the study on SRI vs. Conventional System

SRI method:

- Rice Seed 8-9 Kg/Ha
- Only 7-12 Days during Seedling

- Only 10-15 M2 area for seedling
- Less Water (sufficiency)
- Seedbed (more effective)
- Using Compost to increase soil Fertility
- No Chemical Fertilizer (II)

Yield

- 9-12 Ton/Ha

Conventional System:

- 35-40 Kg Rice Seed/Ha
- 23-28 Days During seedling
- 25-30 M2 Area
- 3-5 planting one hole
- Water flooded (All season)
- Use Chemical

Yield/Ha:

- Only 5-6 Ton /Ha

Prabhat Kumar, Asian Institute of Technology, Thailand (*response 4*)

Yes, Indonesia is taking another lead in wide scale SRI promotion and adoption at farmers level. Our good friend, Mr. Sato san is on lead and recently published some works from there with Norman. The Cornell's university hosted SRI webpage provides a great deal on SRI works there <http://ciifad.cornell.edu/sri/countries/indonesia/index.html#2008> . Beside Indonesia, this site also hosts range of information from several countries in the region and beyond. Enjoy reading this section.

[Bibhu Prasad Mohanty's](#) mail and points are interesting: May I know why 50x50 cm space was provided. To me it seems too much. Most work of SRI I encountered used 20 – 30 cm r x r and p x p space. Contrary to your observation, in the Philippines and in Thailand the land race gives good response to SRI too. As I wrote earlier in my emails on the same topic, the traditional Glutinous Thai Rice RD-6 (normally yields 1.8-2 tons/ha), gave an impressive 4.5-5 tons/ha yield. You could see the response of individual plants in photo attachment (<http://www.solutionexchange-un.net.in/food/cr/res15040807.pdf>) of my previous mails.

But in general long duration varieties performs better, and the reason is that the lower leaves remain green for longer and instead of 'eating away' reserves as parasites, keep contributing to the overall photosynthesis process. Same goes with the flag leaves, as these contributes heavily towards overall yield, these leaves remain green and erect longer under SRI management conditions. That's what I observed in my works with SRI. These observations goes very well with the proposed model of high yield (Mishra et al., 2007, IJAS) paper.

Puspadhar Das, Fresh Producers Society, Guwahati

What I feel and what I have learnt from my own experience on SRI are that:

- It will require lower input of seeds. Compared to 15 to 20 kg of seeds per acre, one can go with 3-6 kg of seeds, which is a huge saving given the dimension of rice cultivation in India.
- It will reduce the total cropping period. By the time of transplantation, it saves almost 15 labour days (22 days in conventional system - 12 days in SRI)

- Even in scarce water condition, this method can be adopted. Given the use and spread of shallow tubewells, irrigation can be controlled. This means saving both in terms of water as well as power consumption.
- It has been tried in the North Eastern states. We have tried at personal level and we are encouraged. We are still at adoption stage and we are still learning.
- The weeding cost can be reduced by mechanising it. Since the space between plants and rows are more, movement of weeding machinery will be easier.

What is required at this stage is:

1. Farmer education: Farmers should be taught about the rice plant first: its biology, its life cycle, its requirements for growth.
2. Demonstration should be conducted to persuade farmers. I think NHB has some scheme to promote the methodology.

As has been said, SRI is not an universal method. Its more of understanding the rice as a plant: its life cycle, and its growth and development. It must be adopted to local conditions and the farmers should be motivated enough to try and develop new methodologies suited to local conditions. For example, we can always develop methodologies suited to the hilly conditions of the North Eastern states, where already rice is grown in jhum condition with scarce (running water) condition.

A study of growth and development of weeds will give a better insight into how labour cost can be reduced as weeding is cited as the major reason for increase in labour cost. By timely control of weeds and their growth, and conversion of the biomass into compost, farmers can get multiple benefit of weeding.

P. K. Thampan, Peekay Tree Crops Development Foundation, Kochi

In the late fifties Japanese method of rice cultivation was introduced in Kerala, India which essentially involved transplanting in lines with wider inter row spacing and using manually operated rotary weeder for weeding. This weeder was very useful, easy to operate and cheap compared to manual weeding. I am not sure whether the system still prevails here.

K. V. Peter, Kerala Agricultural University, Thrissur

System of Rice Intensification (SRI) presumes high tillering, less water use, minimum weeds and consequent low cost of production per unit quantity of produce-paddy. Single plant transplantation is a precise operation to be done by skilled manpower or by transplanter. The puddled field has to be leveled perfectly so that water is uniformly distributed. In a developing country like ours where land holding is small, utility and effectiveness of SRI are questioned.

Sustainability of production, where water is becoming a limiting factor, is itself a matter of concern. Tillering being a genetic trait, SRI may be variety specific. As there is preference for red/white/par boiled/idli rice etc. all the rice varieties may not be suited to SRI. The reported increased productivity should be analysed along with high cost of production. Poor in developing countries need rice to eat at affordable price. Already cost of 1 Kg of rice in India is half the minimum daily wage of a women agricultural labour.

S. C. Prasad, Independent Consultant, Ranchi

SRI is definitely innovative with limited application. Since advantages are less, if other factors are not favourable small and marginal farmers hesitate to adopt. Water and weed managements are limiting

factors in Kharif season and in rainfed areas. SRI are not variety specific, it can be less labour intensive by putting 2 seedlings at one hole, limit to need based irrigation and minimum weeding.

Dip Banerjee, CARMDAKSH, Bilaspur, Chhattisgarh

CARMDAKSH is working in a tribal area of Northern Chhattisgarh, which is totally rain fed. So our main priority is to do something for this rain fed area. I want to share some of my experiences related to SRI. In the first year (2006) we introduced SRI in one irrigated plot with optimum dose of fertilizer we got encouraging result. The production went up from 12 bags to 14 bags (1 bag = 75 kg). We shared this idea with NABARD. They liked our idea and asked to submit the proposal under Rural Innovation Fund.

They sanctioned the project. We tried SRI in different condition like:

- (a) SRI in rainfed condition
- (b) SRI in Irrigated condition (having personal tubewell)
- (c) SRI with 5% model WHS (Water harvesting structure)

Here I want to share the experience of SRI with 5% model. We used this to deal with the erratic monsoon. For last three years, our observation was that there was one monsoon break during the kharif crop. So we calculated 5% model for one irrigation only. Generally, rainfall enters Chhattisgarh by 15th June but this year (2007) it came on 2nd July. We used IR 36 variety of paddy. We used the seed the farmer had kept from the last crop. The demonstration was on two plots of 75 decimal.

We transplanted 11-day seedling in the field with a plant to plant spacing of half feet and row to row is 1 feet and number of plant per hill was one. We used 3kgs of seed for nursery raising. The Farmer used 10 kg IFFCO mix (12:32:16) and urea in two doses 10 kg each in 20 days interval. Hand weeding was done twice one between 25-30 days after transplanting and another after 55 days after transplanting. Total labour was 10 person days for both weeding. We got about 25-30 tillers per plant. As expected, monsoon break happened during grain filling stage. Because of 5% WHS we could maintain the moisture level and we got about 12 bags 25kg as compare to 8 to 9 bag what the farmer use to harvest from that plot. The farmers in the surrounding plots could not even get the seed.

In sum our experience has been:

- (a) It is difficult to mobilize people to transplant the 10th day seeding because they are used to 21-day seedling. Our transplanting got one day delayed because of this.
- (b) Seeing the thin population farmer get annoyed he thought of re-sowing the plot and it was a challenge to convince him to stick to the experiment.
- (c) 5% model helps us to maintain the soil moisture and some wetness, which is favorable for SRI.
- (d) According to the farmer labour requirement is less.

This year we are planning to take this model in some 20 plots.

Bibhu Prasad Mohanty, Bharat Integrated Social Welfare Agency (BISWA), Sambalpur (response 2)

We used local long duration landraces of rice, which have the potentiality of got 25 effective tillers. Secondly, their height is about 4 ft 8 inches to 5 ft 2 inches. Basing on above condition it was decided to give more spacing than the recommended (30cm X 30 cm). However, the result was very encouraging for poor farmers.

Many thanks to all who contributed to this query!

If you have further information to share on this topic, please send it to Solution Exchange for the Food and Nutrition Security Community in India at se-food@solutionexchange-un.net.in with the subject heading "Re: [se-food] QUERY: Systemic Rice Intensification (SRI) - Experiences. Additional Reply."

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