# Policy Consultation on System of Rice Intensification: Learnings and Strategies

***A summary of the deliberations on SRI among various stakeholders, organized by the NCS, highlighting the importance of engaging the scientific community in proving the rigour and robustness of SRI as a method of crop management.***

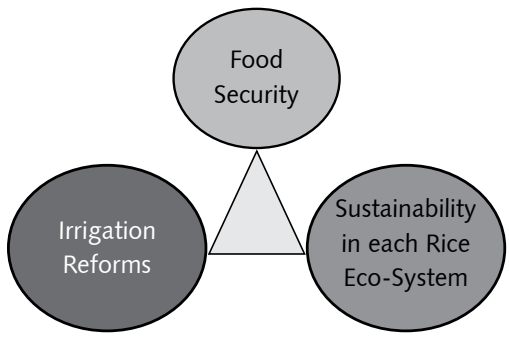
## CONTEXT AND OBJECTIVE

In the current state of the Indian economy, with rising overall prices, the food and nutrition security of households, specifically of small and marginal farmers, has become critical to achieve inclusive growth. With a continuous decline in the total factor productivity, attaining sustainable food security is becoming a challenge in itself. In this scenario, the System of Rice Intensification (SRI) is fast emerging as a sustainable alternative to enhance productivity even as natural resources are preserved. Some of the state governments have proactively supported the practice, with major initiatives from civil society organizations and indeed the farming community has accepted this practice in large numbers across India. However, as is the case with any new initiative, SRI too is being questioned along various dimensions on its scientific veracity. It is, therefore, critical for multiple stakeholders to deliberate together and come to a consensus about how to enhance scientific understanding of the technology, streamline the practice including capacity strengthening and educate policy makers for developing focussed actions around SRI. Against this backdrop, the National Consortium on SRI (NCS), which is a network of like-minded institutions and individuals engaged in promoting SRI, conceived this policy consultation. This consultation was organized with three major broad objectives:

1. Update stakeholders on the activities and achievements of the National Consortium in the past three years, with support from the RRA network.
2. Reach out to policy makers and explore ways of evolving partnerships with the agriculture ministry in the central and the state governments, especially in the rain-fed areas.
3. Strengthen linkages with the stakeholders and expand the Consortium.

## INTRODUCTION

One of the objectives of this consultation has been to invite the scientific community to discuss and throw more light on the science of SRI. Dr. B.C. Barah, NABARD chair professor, pointed out that the success of SRI is beyond doubt; however, it is yet to be validated by the scientific community. Many of the questions raised about SRI can be addressed by the scientific community, to prove the rigour and robustness of SRI as a method of crop management. This will also provide an opportunity to discuss ways and means to ensure food security of small and marginal farmers through SRI.




Today, SRI has generated considerable debate globally, particularly with regard to its potential to enhance rice yields. The average rice yield production with SRI is double and practitioners and promoters of SRI claim it can be increased three to four times. Whereas the opponents say that high yields in SRI is due to a measurement error, it is true that scientific support and validate the claim is missing. Despite this, the increase in the number of SRI adopters in India, has been higher than any other agro-ecological innovations within a short span of time.

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The three pivots of SRI are food security, irrigation reforms and sustainability in each rice eco-system. Each of the pivots has different objectives, and different kinds of research programme are required for each of these pivots, in different geographical locations, involving different actors.

India is primarily an agrarian society with more than 70 per cent of the population living in the rural setting and engaged in agriculture for their livelihoods. India requires a system of cultivation that produces a higher yield, to feed the rising population and conserve resources for future generations as well. It is believed that a method of agriculture similar to SRI existed among farming communities as early as 1911 in India; however, owing to maybe the push of input-oriented agricultural practices, it went out of common practice. SRI is an opportunity for India to address the three immensely volatile 'Es'—economy, employment and environment. SRI seeks to address the food security and the economic growth of the country. Owing to its inherent nature of water conservation and soil preservation, environmental factors are also covered. Some states such as Tamil Nadu, Bihar, Jharkhand, Odisha and Tripura have already adopted SRI on a large scale, with its resultant growth in output, and soil and water conservation.

### Policy Imperatives

SRI is practised in almost 30 countries across the globe; and in India almost two-thirds of the states, covering 2 million farmers, has already adopted this system, informed Dr. Rita Sharma, Member Secretary, National Advisory Council (NAC). SRI addresses two fundamental dimensions—it saves water and reduces the

use of seeds while catering to the needs and requirements of small and marginal farmers. The National Food Security Bill, will create a legal obligation on the state, to provide subsidized food cover to almost two-thirds of the population of the country. It will increase the need for a larger quantum of food procurement by the government. There is great applicability of SRI technology in the sustainable intensification of agriculture. Through the practice of the SRI technology, water is conserved, soil preserved and there is an increase in yield, which consequently will help in addressing the critical aspect of food security of the nation.

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Taking SRI to the policy level is a timely strategy to mainstream SRI as a national policy that will help cater to the food security needs of the country today. A pragmatic consideration will be to garner existing schemes such as MGNREGS with SRI, to address the two-pronged objectives of generating wage days and using these wage days to facilitate transition of small farmers to SRI. MGNREGS is an almost forty thousand-crore programme catering to small and marginal farmers, with a distribution today of 12 per cent and 88 per cent work on individual and community lands, respectively. This distribution must be reversed or, at the least, brought to a level of 75 per cent of works happening on individual lands. This will hugely transform the impact of MGNREGA and promote technologies like SRI.

The opposition to SRI is mainly from some sections of the scientific community. The scientists should now, instead of just speculating, engage in exploring and verifying the veracity of the technology. What is SRI? What contributes to the increased production? Is there a science behind it? Take up rigorous studies with proper controls and educate the world. That is what the scientists must do rather than just reacting to what practitioners claim. Another area of work requiring attention is the capacity building of practitioners, and others. SRI is not uniform, and local-level modifications according to requirements are practical and to be appreciated. There may be a lack of attention to details among the farmers and the practitioners that can only be dissuaded by scientific rigour. At the same time, delay in making SRI a part of the agriculture policy will be a setback; therefore, whereas 'nay-sayers' could carry out their experiments in the field at the policy level, SRI could be introduced to answer the food security and environmental issues of the country.

Prof. (Dr) R.B. Singh, President of National Academy for Agricultural Sciences (NAAS), emphasized that food security at the household level is crucial for small farmers, sub-marginal and marginal farmers, who are also the major focus population of NAAS. Scientific explanation is all about the rigour of the findings as it crosschecks multiple times before proposing or validating any system or experiment. That the farmers are still hungry even when they are the ones who produce food is ironical. Also, water is an important resource, and water-security and preservation are an urgent need of the time as ecological balance has to be maintained alongside economic growth. Water security needs to be addressed to achieve a green economy. SRI detractors mainly fault the system on the lack of availability of technologically refined tools such as weeders, but that is missing the point. There are two aspects that need serious reflection: whether SRI works better with advanced, new seeds or it is more effective with indigenous seeds. These need to be

addressed in order to avoid controversies that may arise about which kind of seeds are better suited to SRI principles. Similarly, another aspect that needs to be determined is does SRI mean only organic or is it amenable to inorganic inputs?

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As a spill-over effect of SRI, sugarcane intensification and wheat intensification have also emerged. This gives rise to semantics issues, which can easily be avoided by referring to these as crop intensification.

In the wake of the recent media story, in which a farmer in Bihar claimed to have produced 22.4 tonnes of rice per hectare, a meeting of some of the farmers practising SRI was convened in Patna. Interestingly, each of these farmers had a different understanding of SRI. There did not seem to be a standard methodology in what they described as SRI. This is where the role of the scientists comes in—to make sense of this variety. The scientific community must engage in appropriate research experiments to study the claims of the SRI community. It is important to not let the confusion multiply. The scientific community should be engaged rigorously and judiciously, to explain the science of SRI and mitigate the controversies upfront.

NAAS proposes to bring out a position paper on SRI within the next 6 months that is by the year end. This is important for giving guidance to state governments and Government of India-sponsored programmes such as National Food Security Mission (NFSM). The Government of India needs to engage with the Consultative Group on International Agricultural Research (CGIAR) to validate SRI. We must work to come out with a position paper on SRI in another 3–6 months. Scientific research must build on innovations on the ground, to produce a judicious system. Innovations include the perceptions and knowledge of the people and not just technology.

Dr. Biksham Gujja, a senior advisor to Worldwide Fund for Nature, said that one of the major concerns of the water fraternity is to explore a system in which rice production needs less water. Conventional methods of rice cultivation require a lot of water. SRI was taken up as a research experiment with 232 farmers, wherein the productivity aspect and water usage were observed. Rice production increased to around 20–30 per cent, and used 30 per cent less water. No other technology has been able to match this performance. There is a very interesting phenomena associated with SRI. Here is a method by which farmers have produced results and yet they are being asked by the scientific community to explain the science behind the method. Vast sums of money are being used for rice research across the world; why then is the scientific community not taking up more extensive research on SRI? More than 2 million farmers are using SRI at this point of time in India.

SRI is not about establishing records; it is about producing more with less input and this is the real issue. Most of the SRI farmers lie at the bottom of pyramid and are struggling for food security. This system could produce a greater yield with lesser quantity of water intake. Rice cultivation in India consumes almost 60 per cent of the water allocated for agriculture; therefore, it is important to explore mechanisms that could lower water consumption and increase crop production. SRI yield is almost 25 per cent higher. Clearly, although more labour-intensive, SRI requires less input, less water and produces more output. NGOs and the other supporters of SRI, on the other hand, must stay away from making any exaggerated claims and pitch for SRI in simple terms.

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### View from the NCS

India today faces three major crises, according to Ravindra A. from WASSAN; one is the *food security crisis,* which is less about production and more about access. The prime focus here are the small and marginal farmers and how they produce and eat. The second crisis is the *ground water crisis*. Rice production in the conventional way consumes large amount of water. The third crisis in the making is the *soil crisis.* SRI could help in production enhancement and water management.

In all the SRI-related debates today, we are mixing the technology of SRI with the diffusion of SRI. A study of all the latest published articles on SRI reveals an increase of around 30 per cent yield due to SRI, which is more than what the hybrid seeds are able to achieve. Scientists are still reluctant to study these phenomena and are not ready to engage with SRI, to see if there is science behind it. NAAS can possibly also establish evidence from already published works from both national and international documents, and arrive at its own logical conclusions.

### Need for Scientific Rigour

Dr. Alam, NAAS, spoke of the experiment commissioned on SRI by the University of Srinagar on cool water rice, which found that seed is definitely saved and that check-row planting helps in the inter-culture of a crop, yielding good dividends. Any inter-culture in a crop is good management practice. That SRI produces more yield by weeding is not surprising. However, the problem arises when people make lofty claims, and forget scientific rigour and practicality. A workshop was organized in Patna for farmers. Each farmer practised a different version of SRI, which is very labour intensive and suited only for small and marginal farmers who have their own family labour. Large farmers cannot adopt SRI because it is difficult to arrange for the labour. Mechanical options are needed in order to be able to adopt SRI on large plots. Otherwise, the advantage made in the yield gets lost in the labour. SRI needs assured irrigation facility, which is very costly; most of the farmers don't have assured irrigation water and so the farmers cannot practise SRI. SRI definitely increases yield and can go up 50 per cent under good management practice. Scientists need to look at the process and then validate SRI.

### Seed Testing in the Local Area

A common problem arising in the field of indigenous paddy seed testing, informed Dr. Mahindra, ICAR, is of validation because verifying the seed in scientific laboratories away from its natural habitat affects the results adversely. Therefore, it was suggested that validation of the crop variety of indigenous nature could be done in the respective state centres, which the ICAR system has across the country.

### SWI Trial by IARI

Dr. Shivdhar Mishra and Dr. B.C. Barah spoke of the experiment conducted at IARI under the PPP model, wherein IARI collaborated with NCS and commissioned an on-station study of experimenting with the System of Wheat Intensification (SWI) through intensive farmer-practitioner-scientist interaction. The protocol for SWI, as practised by NCS partners, was shared with the scientists before initiating the experiments. Principles such as seed treatment, dibbling two seeds per hill, wide spacing, alternate wetting and drying, regular

weeding, manure compost are the key to the success of SWI technology. Farmers from Rajasthan, Uttarakhand and Bihar participated in this experiment. Broadly, the findings so far in the study are similar to what has been found elsewhere. Wider spacing maximizes the use of air and energy for plant growth noticeably. The use of mechanical weeding offers soil aeration for enhancing soil biota and root growth. Compost manure helps create a more enabling environment to soil biota and plant cell development. Using the variety HD 2967, developed at IARI, the yield of SWI was 7.96 ton/ha, whereas the conventional experimental plot gives 6.1 to 6.6 ton/ha. There is also perceptible improvement in other plant and root characteristics due to SWI practices, such as plant dry mass, thousand grain weight, plant height and grain per panicle. The significant build up of available nutrients (NPK) and carbon at post-harvest state was observed. The highest production was observed in SWI (direct seeded achieving around 8 tonnes per ha).

The data need to be analyzed further for understanding the economics of cultivation, using different means.

**Experience of IAMWARM Project**

The Irrigated Agriculture Modernization & Water-bodies Restoration and Management (IAMWARM) project has been initiated with an objective to improve irrigation service delivery and productivity of irrigated agriculture with effective integrated water resources management in a river basin/ sub-basin framework in Tamil Nadu said Dr. B.J. Pandian from Tamil Nadu Agriculture University (TNAU). This will be achieved through investments for modernizing irrigation infrastructure (including system rehabilitation, on-farm works, technical and managerial upgrading of institutions involved in irrigation development, operation and management, diversification of agriculture with appropriate extension measures and marketing linkages, promoting public-private partnerships, piloting innovative irrigation infrastructure development and management options), and re-orienting and strengthening institutions and instruments required for integrated effective water resources management in the state (including unbundling resource management from service delivery institutions).

The project is a six-year experiment that began in 2007 and will end this year in 2013, with a total outlay of Rs 2,400 crores in 63 sub basins in three phases. At the initial stages, the challenges faced by the project were: farmers' traditional mindset, lack of awareness, skill upgradation of labourers, lack of regulated irrigation, and timely availability of implements. To address these challenges, the project devised certain innovations in the field, which helped them disseminate awareness and acceptance about the system. Some of these were exposure visits, rural artisan training, popularization through publications and training to labourers. The project is nearing its end. The major lessons learned are: SRI improves productivity, reduces cultivation expenditure, saves seeds, saves water, ensures better functioning of the root system, and the plants are non-lodging during aberrant weather. The recommendations from the study are:

a. Niche areas for SRI need to be identified because SRI promotion should be based on the suitability of soils, season and water source.
b. SRI components need to be standardized to suit each region of practice, and allow local modifications in SRI practices, to achieve the principles of SRI.
c. A mechanical transplanter needs to be

developed or modification of the existing transplanter needs to be carried out to suit SRI principles; a low-cost, user friendly weeder needs to be developed for adoption.

d. Intensive capacity building and exposure visits need to be undertaken, to understand SRI principles and change the mindset of the farmers.

e. Favourable policy support from government needs to be advocated to promote SRI.

### State Initiatives at SRI Scale-up: NCS Studies in Bihar, Jharkhand, Chhattisgarh and Odisha

Amit Saha and Amit Kumar, independent consultants, recounted that, in Bihar, SRI started in 2007, through the collaboration of Civil Society Organizations (CSOs) with Bihar Rural Livelihood Project Society (BRLPS). For the initial two years, it was limited to BRLPS and a few leading CSOs such as PRADAN. The collaboration with the state government began later, and 2011 was declared 'Year of SRI'. The plots for demonstration cover approximately 5 lakh ha. There are almost 1 lakh SHG members in 8,673 ha across 55 blocks in 9 districts. Currently, the CSOs engaged there are PRADAN, BASIX and AKRSP, which are actively involved in spreading SRI with more than 30,000 households. Input support is a major component in government-supported SRI, which is approximately Rs 3,000 per acre per farmer. The main observations from the field are: grass roots-based institutions like SHGs are effective; there is a need to improve the quality extension resources in the communities; and mass awareness has positive results in information dissemination. The challenges faced are: input distribution

**Table 1: Yield Comparison of SRI with Conventional Method**

| Year | Yield (Kg Ha$^{-1}$) | | % Increase | Area under Demonstration (Ha) |
|---|---|---|---|---|
| | SRI | Conventional | | |
| 2007–08 | 5,709 | 4,465 | 28.3 | 1,311 |
| 2008–09 | 6,710 | 5,035 | 33.3 | 2,581 |
| 2009–10 | 7,058 | 5,139 | 37.3 | 4,000 |
| 2010–11 | 6,856 | 5,177 | 32.4 | 10,089 |
| **Average/Total** | **6,583** | **4,954** | **32.9** | **17,981** |

**Table 2: Beneficiary-wise Analyses**

| Year | Per Cent Increase in Yield over the Conventional | | | | | | |
|---|---|---|---|---|---|---|---|
| | <10% | 10-20% | 20-30% | 30-40% | 40-50% | >50% | Total Number |
| 2007–08 | 337 | 311 | 363 | 301 | 144 | - | 1,456 |
| 2008–09 | - | 568 | 678 | 1,004 | 387 | 392 | 3,029 |
| 2009–10 | 71 | 567 | 543 | 331 | 2,790 | 943 | 5,245 |
| 2010–11 | 105 | 1,158 | 2,662 | 1,918 | 1,503 | 2,421 | 9,767 |
| **Total** | **513** | **2,604** | **4,246** | **3,554** | **4,824** | **3,756** | **19,497** |

became the main focus of the agriculture department during SRI promotion; issues with the capability and commitment of the Kisan Salahkars about the inclusion of poor, landless and share croppers; post transplantation follow-up and monitoring; and farmers' dropout rates despite their being supported during the preceding years.

*A strategic multi-tier intervention was made that emphasized certain significant factors. It was suggested that farmers' empowerment should be made the core of the entire practice*

In Jharkhand, the project was started in 2003–04, with mainly CSO collaborations. Government support has been minimal, with only incentive support provided to farmers. Currently, the collaborative efforts of NABARD and other CSOs have touched more than 80,000 households. In 2011–12, government gave incentives to 53,400 households for adopting SRI in 30,000 ha. The observations from the field reflect that the presence of reliable CSOs at the grass-roots is advantageous and the partnership and convergence models whereby NABARD and SDTT have collaborated with CSOs have proved very effective. The experience of CSOs serving as resource organizations is very positive. NABARD reports show that SRI has improved the level of food security from 3 to 12 months for small holders.

In Chhattisgarh, the initiative was started in 2008 when PRADAN in collaboration with 11 NGOs carried out field trials of SRI with 800 families in 80 ha of land. The SDTT-PRADAN partnership has been instrumental in spreading SRI knowledge to about 16,000 families, covering 340 villages in 11 districts. This has led to the formation of state-level forum known as the 'SRI Manch'. The state has disbursed a cash subsidy of about Rs 3,500 per ha to each farmer, the demo in 20,000 ha amounting to Rs 7 crores. The field learnings in the area are that the proper selection and availability of farm implements is critical; the use of green manure and vermi-composting is limited; and there is need for committed funding in order to sustain the effort.

In Odisha, the project was begun in 2007, with a multi-stakeholder workshop that resulted in the formation of the 'Learning Alliance'. Thereafter, through 2007–08, an exposure visit of a government official to the adjoining state of Andhra Pradesh resulted in the adoption of 2,000 demonstration plots funded under Rashtriya Krishi Vikash Yojna (RKVY) scheme. NABARD and SDTT support to the CSOs since 2008–09 has benefited SRI promotion immensely too. In 2009–10, under the RKVY scheme, almost 11,575 ha were covered with SRI practice. In fact, the following year, SRI planning was done at the *gram panchayat* level. Some of the observations from the field here are that the cluster development approach in line sowing has made visible impact. Line sowing and weeding operations are the only two visible features found at field because a large number of small farmers are share croppers for whom it was not always possible, to adopt the whole package of practice. The challenges observed in the field range from the fact that line sowing has diluted the importance of other SRI principles, big farmers still not participating fully in the SRI programme, to farmers rarely availing any support assistance when pest attacks occur, and to the HYV seed promotion strategy needing to be looked at again.

A strategic multi-tier intervention was made that emphasized certain significant factors. It was suggested that farmers' empowerment should be made the core of the entire practice. The development of appropriate technologies extension services should then be looked

into and, consequently, a uniform knowledge base and capacity building of all the stakeholders should be undertaken. Last, SRI requires a policy stand with a separate budgetary allocation. At the micro-level, social mobilization, resource augmentation and area development, and the mobilization of mainstream resources and employment will be facilitative in encouraging SRI practice.

*That SRI benefits not only individuals (through enhanced income/ unit area) but also the public (through saving in irrigation water, reduction in carbon emission, etc.) is a fact*

### An Innovative Extension Mechanism for SRI

Dr. N.K. Sanghi from WASSAN, a Hyderabad -based organization emphasized that reforms are needed in the delivery mechanism for promoting SRI, which primarily focuses on 'knowledge-centric' rather than 'input-centric' development. The conventional approach of holding 'demonstrations' with a small number of farmers and expecting that the subsequent coverage will take place through a natural diffusion process has not been found to be relevant for SRI. We have to reflect whether a project management approach is to be considered for promoting SRI. A new set of tools/instruments are to be used to motivate farmers and to provide educational inputs in a cost effective manner. The formal extension system needs to play a new role, with greater space for informal communication. Common interest groups (CIGs) could play a central role in sustaining SRI after the project period. That SRI benefits not only individuals (through enhanced income/unit area) but also the public (through saving in irrigation water, reduction in carbon emission, etc.) is a fact. A project management approach needs to be adopted through partnership with experienced project implementing agencies (PIAs), on the pattern of participatory watershed management programme. The flow of funds to the identified CIGs for development component and to the experienced PIAs for capacity building, institution building, administration, etc., are important. Flexibility in adoption of strategic options, depending upon the existing status of SRI adoption in the concerned district, is required too. Pro-active partnership between formal and informal extension systems, even at the district level, through three separate streams to promote SRI (large-scale promotion, challan fund-based promotion and intensive R&D) is necessary.

The adoption of a simplified concept of field schools for farmers to enhance their knowledge and skills will help disseminate knowledge in a structured manner. SRI farmers need to be organized into CIGs on the pattern of SHGs, to ensure sustainability. A compact block approach for a three-year period (on a project mode), particularly in areas where water management requires a group action (under tank, canal, etc.), will yield positive results. Initiatives such as exposure visits and the hiring of experienced farmers as consultants (to be paid against outputs) could also be considered. Management of equipment (for SRI) through the local SHG on a custom-hiring basis (rather than providing it to individual farmers on subsidy basis) will be helpful. The PPP model could be experimented with to include the formal and informal extension systems for greater visibility and acceptance. The concept of payment for public good, which would mean that continued incentive be provided to practising farmers for a 10-year period for larger environmental gains they bring in, could also be considered.

### Experiences from Punjab

Dr Amrik Singh from Punjab Agriculture University (PAU) spoke of a study that was conducted by the Farmer's Advisory Service

Scheme at PAU and Department of Agriculture, Gurdaspur, in 2010. This was a joint trial on the evaluation of four different methods of paddy transplanting—SRI, standard transplanting, direct sowing in dry conditions, and the farmers' method. The results showed that in comparison to the other three methods, SRI worked wonderfully in all the parameters such as inter-culture and spacing. However, more research activities are needed on the quantification of water for irrigation, mechanized weeding and fertilizer use efficiency in different soils.

*PRADAN follows a two-pronged strategy when promoting SRI. In the direct implementation model, professionals engage directly with SHGs and clusters through Community Resource Persons. In the non-direct approach, PRADAN works in support with various networks*

**PRADAN's experiences**

Mr. Ashok Kumar from PRADAN recalled that PRADAN started its journey in SRI in 2003 with less than 1 ha of land belonging to four families. By 2012–13, about 45,000 families practise SRI in 6,500 ha of land. This is spread out in 4,600 villages/hamlets across 6 states, and the average productivity is around 6 tonnes per ha. PRADAN today is trying to ensure food grain sufficiency for small holders. PRADAN follows a two-pronged strategy when promoting SRI. In the direct implementation model, professionals engage directly with SHGs and clusters through Community Resource Persons (CRPs). In the non-direct approach, PRADAN works in support with various networks such as Vikash Bazaar Network (VBN) and SRI Manch. PRADAN also works closely with the implementing agencies and provides them support as a resource organization. It also provides end-to-end solution to the funding agency.

Some of the main reasons for adopting SRI among small and marginal farmers are less seed requirement, less labour and water, less area for nursery, low pest attack, easy to harvest, more grain and more biomass yield, and healthy and bold grains. Some of the reasons for the non-adoption of SRI and for dropping out of SRI among farmers are erratic rainfall, which does not allow transplantation at a stipulated time; field conditions, which prevents timely weeding; heavy demand of labour and unavailability of trained labour. The non-availability of effective weeders and markers in the local area are also two other reasons.

The challenges faced by the small and marginal farmers and the ways and means to meet these are listed below.

1. Rainfall risk: There is a need to integrate water bodies (farm ponds) with SRI and this can be done in support with various government programmes such as MGNREGA, RKVY, IWMP and NABARD.
2. Mechanization: There is a need to support mechanization in SRI. Low-cost, user-friendly weeders, markers, reapers and mini-tractors need to be developed to support SRI. These equipment must be made available to farmers when they need it; for this, the government extension system and the private sector could be involved. There is also need to develop locally suitable equipment, taking support from Krishi Vigyan Kendra's and resource institutions.
3. Sustaining efforts: In order to sustain these efforts, there is need to support the family for a longer period of around 3-4 seasons, and include a significant number of farmers practising SRI in a village. The timely availability of inputs and services is required to sustain efforts to up-scale

SRI. Soil health and social mobilization should also be within the focus to sustain efforts.

4. Expansion: There is need to bring SRI in the mainstream of agriculture training programmes; for this the government agricultural extension system should play the lead role in large-scale expansion. ICAR and associated institutions should include SRI and other systems of crop intensification as their mandate. There is need to establish collaboration with NGOs and community based organizations to scale up SRI and build upon the knowledge and social capital created.

*There is improvement in soil health and microbial life. Inter-culture operations help the plant to exploit the full genetic potential of the plants and thus produce more with less input*

### Study of Dis-adoption Behaviour

Rahul Kumar from PRADAN focused on the objectives of the study conducted to examine the status of adoption of SRI and to study the cause and effects of dis-adoption behaviour; to examine the performance of SRI in rainfed areas in comparison with the irrigated areas; to assess the impact of SRI on household food security in rain-fed as well as irrigated areas; and to analyze the farmer's perceptions of the preference of the practice and derive policy imperatives. It was a longitudinal study where data from Keonjhar and Gaya was collected in the first year. In the same year, data was also collected from Tamil Nadu and Uttaranchal. Some of the salient findings of the study are that productivity under SRI management increases by around 50–100 per cent. Increase on net return is around 60–70 per cent. There is nearly 90 per cent saving of seeds and 30–40 percent saving of water. There is improvement in soil health and microbial life. Inter-culture operations help the plant to exploit the full genetic potential of the plants and thus produce more with less input.

High production was the main reason for adopting SRI in comparison with the conventional method of agriculture. The other factors were less labour, less input cost such as that of seeds, fertilizers and water. More tillers, more profit from paddy cultivation and enhanced land productivity were yet other factors that led to SRI being adopted in Gaya and Keonjhar.

That the practice of SRI was dis-adopted by some was also observed during the survey. The dis-adoption of SRI, as measured in number of farmers who did not continue, was to the extent of thirteen farmers in Gaya (11 per cent) and 11 (10 per cent) of the sample farmers in Keonjhar. The reasons cited for dis-adoption were beyond the control of human beings. Severe chronic drought during past three years and the erratic rainfall, ultimately leading to water scarcity was the main reason for dis-adoption in Gaya. In Keonjhar also the reasons were similar, viz, water problem, sickness and labour problem as well. Therefore, the disadoption was termed as in-voluntary disadoption.

### A Comparative Study of Indigenous Paddy Variety in SRI and Non-SRI Practice Conducted by the NCS in Six States

Soumik Banerjee, an independent consultant based in Jharkhand, presented the findings of the study in six states, namely Chhattisgarh, Odisha, West Bengal, Maharashtra, Meghalaya and Tamil Nadu, and assessed the performance of IPVs under SRI and the non-SRI practices. Indigenous varieties are those cultivated among the local community that has a long traditional farming history. As many as two lakh varieties of rice cultivars

were there in India. In fact, more that 1,750 cultivars existed before the Green Revolution. The data was collected through the triangulation of different methods, in order to address the richness and diversity of the subject. The hypothesis and the myths surrounding IPVs as low yielding, lodging and having more straw with less grain was proven to be false. There are almost 800 varieties of IPVs preserved in the study areas. The findings indicated that the practice of SRI with IPVs does not show incidences of pest attacks or diseases in the crop; enhances productivity; has less or no lodging; requires less time and labour in agricultural operations; has reduced rates and so on. The resistance to multiple task and quantifiable benefits are among the best qualities of the IPVs, which have long been accepted by the farming community.

*The findings encouraged the practice of SRI with IPVs, with no incidences of pest attacks or diseases in the crop; higher productivity; less or no lodging; less time and labour requirement in agricultural operations; reduced seed rates, and so on*

We need to reflect on the dimension of knowledge and fact-sharing with the larger community, for wider acknowledgement and acceptance. The listing of IPVs in the database, adaption and recording of the practice by individual farmers on Web will be useful for interested people to get in touch with the field and verify facts on their own. The need for validation of crop varieties for wider adoption could be regional but accreditation would be beneficial for the preservation of the species of such indigenous crops. The details of production data of around 94 IPVs under SRI management practices were presented. Ten varieties produced more than 6 tonnes per ha whereas 28 varieties produced between 6 and 8 tonnes under SRI practice.

In Chhattisgarh, of the 49 indigenous varieties studied, 5 had produced more than 8 tonnes per ha. In Maharashtra, of 5 varieties, 2 produced between 6 and 8 tonnes per ha. In Odisha, of the 33 varieties studied, 5 had produced more than 8 tonnes per ha, and 12 produced between 6 and 8 tonnes per ha.

**The NCS**

The systems of crop intensification have the potential to address the food security and resource conservation concerns of the country and this knowledge needs to be widely disseminated and mainstreamed. NCS has been consistently working on crop intensification and believes SRI needs to have more visibility. It has carried out various studies to understand and validate the utility of SRI for the small and marginal farming section of agriculturists. Findings of the comparative studies of IPV in SRI and non-SRI practices or those conducted in other states need to be consolidated in order to arrive with some degree of finality about the factors that influence or hinder the adoption of the system in the field. There is need to look forward to delve into what more should be done, how linkages have been built over the period with various agricultural institutions, etc., could be further explored and draw leverage from the already existing networks.

NCS seeks to extend its engagement at the state level and to influence the state-level allocation of funds and streamline the extension mechanisms. It also seeks to increase engagement with the scientific community, to mainstream the idea of crops intensification in the scientific discourse. That will give SRI the legitimacy and space to be recognized as part of flagship programmes and ensure that more allocations of funds flow to it.