

# Report on National Workshop 2003 on System of Rice Intensification (SRI)

## **Executive Summary**

IRRI/PETRRRA SRI sub-projects of Bangladesh organized a day-long workshop on the System of Rice Intensification (SRI) on 24<sup>th</sup> December 2003, at IDB Bhaban, Agargaon, Dhaka. Policy-makers, donor representatives, researchers, extensionists, NGO representatives and farmers attended the workshop. The workshop was intended to share the experiences with SRI by researchers, extensionists and farmers, and to develop future plans to carry forward the SRI initiatives. The workshop was divided into three parts: inaugural session, technical session, and review session.

The inaugural session was chaired by Dr. M. Nurul Alam, Executive Chairman, BARC. The Honorable State Minister for Agriculture, Mr. Mirza Fakhrul Islam Alamgir, MP, attended the workshop as Chief Guest. Professor Norman Uphoff, Director, CIIFAD, USA, was expected to attend in the session as Special Guest. But unfortunately he was not able to attend in the workshop due to immigration problem faced at ZIA International Airport. Professor Muazzam Husain, National Coordinator, SRI Sub-project (SP3602), delivered the welcome address with a briefing on history and background of SRI in Bangladesh. He also briefly outlined the SRI methods of crop establishment.

In his address, the Chief Guest emphasized keeping up the current growth trends in agriculture to face the challenges of globalization. Referring to research output on SRI by the researchers, he said success of SRI in Bangladesh is not yet remarkable but the concept behind the SRI methods may contribute significantly in increasing rice production in Bangladesh. He also mentioned that to promote SRI it would be necessary to increase the interaction among the organizations involved in agriculture development.

The Chairperson of the inaugural session noted that SRI method has not yet been disseminated widely in Bangladesh. Researchers are working on SRI in limited scale. He also mentioned that SRI is a kind of integrated production system. He called upon all concerned to devote concerted efforts to explore the potential of SRI method in Bangladesh.

The technical session was chaired by Dr. A. R. Gomasta, Director-Research, BRRI. Seven papers were presented in the session by researchers, extension specialists and NGO officials. Moreover, ten designated farmers from different parts of the country shared their experiences on SRI. In contrast to the research reports which tended not to have positive evaluations, the presentations from the NGOs and DAE officials indicated positive results attained from SRI trials on farmers' field. NGOs and extension personnel found SRI yields to be higher than those attained from farmers' present practices, and also more profitable. Nine farmers out of ten firmly expressed their support for SRI practices, and they informed the house that they got significantly higher yield through SRI practices than with their traditional practices.

In the open discussion session, there was a distinct difference between the researchers, on one hand, and extensionists, both GO and NGO, on the SRI issue. However, finally everybody agreed that the gap between the researchers and

extensionists should be minimized for the betterment of the farmers. Many participants were of the opinion that since the end-users of the system, i.e., farmers, were present in the workshop, they would be the right persons to decide on this issue.

In conclusion, the chairperson of the session firmly expressed that the researchers have been working on the issue of SRI and will continue further as required. He also mentioned that if any new technology is proved beneficial to farmers, they will adopt that technology, no matter whether the researchers or extensionists recommend that technology or not. But he suggested validating any new technology by BIRRI to avoid any possible losses to farmers.

The review and planning session was chaired by Mr. Wasiuzzaman Akanda, Additional Director, DAE, Chittagong, and was facilitated by Mr. Indu Bhuson Roy. The workshop participants were divided into three groups, and each went through a discussion session where they tried to find out the benefits and limitations of SRI practice. They also made some recommendations to address the limitations, and chalked out future plans to carry forward the SRI initiatives. The individual groups presented their findings in a plenary session.

Lower amount of seed requirement, higher yield, easy weed management, feasibility for resource-poor farmers and environment-friendly cultivation practices, etc. were identified as the benefits from SRI practice. On the other hand, higher labor requirement, high seedling mortality rate, difficult irrigation management, and absence of synchronization in flowering and maturity stage, etc. were identified as limitations of SRI practice.

As for future plans, the groups suggested seeking assistance from donors for further continuation of SRI activities, emphasizing collaborative experimentation by farmers, extension workers, NGOs and researchers, and recommending a participatory community approach for wider dissemination of SRI.

At the end, Professor Muazzam expressed his appreciation for the enthusiastic, lively and fruitful participation of all participants in the workshop, and he thanked all present including the farmers for their valuable contributions. In terms of fulfilling the objectives, the workshop was a successful event.

## Glossary of Terms

SRI	System of Rice Intensification
BIRRI	Bangladesh Rice Research Institute
IRRI	International Rice Research Institute
DAE	Department of Agriculture Extension
DD	Deputy Director
AD	Additional Director
PETARRA	Poverty Elimination Through Rice Research Activity
BRAC	Bangladesh Rural Advancement Committee
BARC	Bangladesh Agricultural Research Council
SAFE	Sustainable Agriculture and Farming Enterprise, and NGO
PSO	Principal Scientific Officer
SSO	Senior Scientific Officer
CSO	Chief Scientific Officer
NGO	Non Government Organization
CIIFAD	Cornell International Institute of Food and Agriculture Development
RFS	Rice Farming System
AAS	Agricultural Advisory Society
ED	Executive Director
CIMMYT	International Centre for Maize and Wheat Improvement
Bigha	An area which is one-third of an acre
ESS	Economics and Social Science
NCT	New crop establishment technology

## **Introduction**

A day-long national workshop on the System of Rice Intensification (SRI) was held on 24<sup>th</sup> December 2003 at IDB Bhaban, Agargaon, Dhaka. The workshop was organized by the IRRI/PETRRRA sub-projects on SRI. Policy-makers, donor representatives, researchers, extensionists and NGO representatives attended the workshop. In addition, farmer representatives from different organizations, those who are directly involved in SRI practice, attended the workshop as participants. There were three main objectives of the workshop:

1. Experience sharing: Results and experience would be presented and shared by different institutions and sub-projects. Farmers will also participate from all SRI sub-projects to narrate their experiences.
2. Reviewing of the performance of on going SRI trials: Three questions on SRI to be sharply developed were presented by the facilitator for discussion by the open forum. These were benefits/advantages, limitations, and recommendations.
3. Chalking out future plans: An appropriate plan for future action will be formulated based on the potentiality of SRI in Bangladesh. Sub-project duration, if considered necessary, may be prolonged for further trials/experimentation on adoption of SRI in Bangladesh aiming to meet the growing demand for food.

The workshop was divided into three sessions: inaugural session, technical session, and the review and planning session. The workshop programme schedule was announced by Mr. Sirajul Islam, SSO, BRRI, Gazipur.

## **Inaugural Session**

The session was chaired by Dr. M. Nurul Alam, Executive Chairman, BARC. The Honorable State Minister for Agriculture, Mr. Mirza Fakhrul Islam Alamgir, MP, attended the workshop as Chief Guest.

At the beginning of the workshop, Dr. Musharraf Hossain, CSO, BRRI, Gazipur, recited from the Holy Quran. On behalf of the organizing committee, Professor Muazzam Husain, Chairperson, Department of Economics and Social Science, BRAC University and National Coordinator, SRI gave the welcome speech. In his speech, Professor Muazzam welcomed all participants and guests and expressed his thanks for their participating in the workshop. He also gave special thanks to the Chief Guest and Chairperson of the inaugural session for their kind participation. He informed the house that as mentioned in the workshop schedule, Professor Norman Uphoff, Director, CIIFAD, USA, was expected to attend the session as Special Guest. Although he had arrived at ZIA International Airport, Dhaka in time, he was not able to enter the country due to immigration problem. Prof. Uphoff had thought that he would get entry visa upon arrival at ZIA. He was not updated on recent changes in the immigration policy of Bangladesh. He tried to communicate with Professor Muazzam, Professor Yunus of Grameen Bank and Mr. Fazle Hassan Abed of BRAC from the airport but he failed to do so as he tried with old six-digit telephone numbers. Being unsuccessful to enter into the country, he went back to Singapore the same night. This was really unfortunate.

Professor Muazzam also informed the house that Dr. Uphoff sent an e-mail to him addressing all workshop participants where he explained the causes of his inability to attend in the workshop. Professor Muazzam read out the e-mail to all participants.

Then Professor Muazzam briefly explained the concepts and background of SRI to the participants. He informed that with proper and effective integration of soil, water and nutrients, the rice production could be increased significantly without increase in production cost through SRI method. He also mentioned that higher production might be possible from any cultivable variety of rice if we practice SRI methods properly. SRI was especially suitable for resource-poor farmers and was environment-friendly, contributing to sustainability of rice production.

As background of SRI, he mentioned that, SRI system was first introduced by Fr. Henri de Laulanie in the early years of 1980s at Madagascar. In Bangladesh, the SRI was first introduced by DAE and CARE Bangladesh in Kishoreganj and Rajshahi districts during the Boro season of 1999. Since then, some NGOs, DAE and BRRI have been validating the system in different parts of the country, both in farmers' fields and on research stations.

Currently many Asian countries like China, Cambodia, Laos, India, Sri Lanka, Indonesia and others have also been testing this SRI method with their farmers. Work on SRI is also being conducted in a number of countries of Africa and Latin America.

He also mentioned that Bangladesh achieved remarkable success in increasing rice production over the recent years. But due to high production cost and comparatively low market price, farmers are not getting expected profits from their increased production. In this context, considering the potentiality, introduction of SRI methods in selected areas of Bangladesh might be a good option for ensuring benefits for rice growing farmers and to help improve food security.

He called upon the workshop participants and others concerned to put more concerted efforts to test the potentiality of the system in Bangladesh and to disseminate the same wherever possible. At the end of his speech, he again thanked all participants and guests and hoped for their fruitful contributions to the workshop to make it a success.

The Chief Guest, Honorable State Minister Mr. Mirza Fakhrul Islam Alamgir, MP, first expressed his thanks to the workshop organizers for inviting him as chief guest. He said he always bears special interest to attend such a workshop with an agenda on rice, as rice is rooted deeply in the culture and history of Bangladesh. He mentioned that rice production is the most important economic activity in Bangladesh. It serves to provide staple food and self-sufficiency in food. Mentioning the population growth he said the population of our country has doubled since independence, and it is the major challenge of the country to feed the increasing population.

He agreed that the agricultural scientists and others concerned who provided outmost effort to increase country's food production deserve thanks. Currently we are at the stage of reaching self-sufficiency in food. The Chief Guest also stated that with continuous reduction of cultivable land due to increasing use of land for non-agriculture purpose, our future challenge would be to retain the current trend of growth in agriculture.

At this stage, the Chief Guest referred the term 'Food Sovereignty' which we need to achieve in Bangladesh. He also explained the need to ensure food security, which can provide access for all citizens to food.

Referring to research output on SRI by the researchers, he said that the success of SRI in Bangladesh is not yet remarkable, but the concept behind the SRI methods may contribute significantly in increasing rice production in Bangladesh. He also mentioned that to promote SRI, it would be necessary to increase the interaction among the organizations involved in agricultural development. Further he noted that to keep pace with the era of globalization, attention should be given to increase production and reduce production cost. Otherwise, our rice would not be able to compete with the rice of neighboring countries in the market. For example he mentioned that India was able to reduce the production cost, and they are now selling rice in international market with lower price. He also expressed thanks to all concerned who are involved in SRI initiatives. Further he drew the attention of media people to reflect the true picture to avoid confusion of the readers. At the end, the Honorable Chief Guest formally inaugurated the workshop.

Chairperson of the inaugural session, Dr. Nurul Alam, Executive Chairman, BARC, thanked the workshop organizing committee for giving him the opportunity to chair the session. In his speech, he reiterated some opinions of the Chief Guest and expressed his solidarity with those opinions. The chairperson mentioned that SRI method has not yet been disseminated widely in Bangladesh. Researchers are also working on SRI in a limited scale. He also mentioned that SRI constitutes an integrated production system.

He explained that per capita arable land in Bangladesh is very small. Therefore, our degree of challenge is higher than that of other neighboring countries in ensuring food security for a rapidly growing population. Given the context, if any new production system, which is environmentally sound and can increase productivity, should be considered positively by all concerned.

Further the chairperson mentioned that India and Vietnam provide input and export subsidies for rice. He opined, in this context, that if we do not do the same, our rice will face severe competition in open market with the rice of those countries. At the end of his speech, the chairperson called upon all researchers, extensionists and NGOs to work in collaboration with the objective to change the socio-economic status of our farmers. Again he expressed his thanks to all participants and declared the inaugural session closed.

At this stage, the workshop was adjourned for tea break, and the announcer invited all participants and guests for tea.

### **Technical Session**

After tea break, the technical session started with Dr. A. R. Gomasta, Director-Research, BIRRI, in the chair. The session was divided into three parts. In the first part, the researchers from different BIRRI stations, DAE and NGO officials presented their findings on SRI. In the second part, participating farmers who are directly involved in SRI practice in different parts of country shared their experiences on SRI practices. The third part of the session took place after lunch break and there was an open discussion on the presented technical papers and farmers' shared experiences.

The chairperson invited the researchers and farmers one by one according to schedule to present/share their findings in brief. Each researcher was given 10 minutes for presentation. The chairperson requested the audience not to raise any question or clarification during presentation rather he suggested to raise those during open discussion session.

The summary of the presented technical papers and farmers' experiences is given below in brief. The detailed technical papers are attached with this report as annexure. The first two papers were presented by BRRRI scientists based on their work in research stations. The third paper was based on results obtained at farmer-level demonstration plots under DAE. The fourth paper presented findings on SRI trials at farmer level conducted by NGOs and a private organization. The last papers were based on trials in farmer plots and research station plots conducted by BRRRI scientists in collaboration with local NGOs.

**First Presentation: Validation and Evaluation of SRI and New Crop Establishment Technique under Two Water Regimes.**

Authors: Akhter H. Khan, Harunur Rashid, A. Quddus, Sariful Islam, M. Ibrahim, N. I. Bhuiyan, A. R. Gomosta, J. M. Duxbury & Julie G. Lauren. Presented by Akhter Hossain Khan, PSO, RFS, BRRRI, Gazipur.

The objective of the trial was to validate and evaluate SRI and the new crop establishment techniques (NCT) along with conventional practice under two water regimes during Boro season. The location of the trial was BRRRI headquarter, Gazipur, and the trial was conducted in the Boro seasons of the years 2001-2002 and 2002-2003. Cornell University provided the required fund for trials through local CIMMYT office.

As conclusion Mr. Akhter mentioned that in these trials, the new crop establishment techniques (NCT) and SRI package failed to produce any agro-economic advantage over the conventional practice and rather reduced advantages markedly. Several constraints to SRI packages like uprooting and transplanting of young seedlings, repeated gap-fillings resulting from high seedling mortality, weed infestation and irregular maturity (the most undesirable phenomenon), were experienced during experimentation. *See more details of the report in Annex 1.*

**Second Presentation: Validation of the System of Rice Intensification (SRI) through Water Management in Conventional Practice and Bed-Planted Rice as Experienced from BRRRI Regional Stations**

Authors: M. A. Mazid, B. Karmakar, Craig A. Meisner, and John M. Duxbury. Presented by Dr. M. A. Mazid, PSO and Head, BRRRI Regional Station, Rangpur.

Studies were initiated by the BRRRI Scientists to validate the SRI practice of crop production at BRRRI Regional Station of Rajshahi, and BRRRI Gazipur during Boro 2001-02 and continued to T. Aman 2002, and Boro 2002-2003 at BRRRI regional stations of Rangpur, Rajshahi and Gazipur through BRRRI-Cornell-CIMMYT collaboration.

Major findings of the studies:

Conventional practice of rice cultivation gave significantly higher grain yield, required less water, and increased water use efficiency compared to the SRI method of crop establishment.

SRI method with 30x30cm and 40x40cm spacing and younger seedlings increased number of panicles per hill but total number of panicles per unit area was found to be low. Seedling mortality was very high either in SRI or on beds compared to conventional practice; weed infestation was also higher with wider spacing, bed, and alternate water treatments.

In conclusion, it was mentioned that the 'SRI practice is not necessary for growing rice near the 'yield potential,' and the conventional method of crop establishment was recommended for rice cultivation. *See more details of the report in Annex 2.*

### **Third Presentation: SRI Extension through Department of Agricultural Extension**

Md. Wasiuzzaman Akanda, Additional Director, DAE, Chittagong Region, presented the report of Department of Agricultural Extension experience with SRI trials.

In introduction he mentioned that the rate of SRI extension is not very high yet, and the efforts are moving slow and simultaneously in the various districts of Bangladesh. He informed that the DAE first introduced this method in Kishoreganj district in 1999. Then he explained the SRI methods that DAE is practicing in farmers' field through demonstration plots.

He presented results of 232 SRI demonstration plots from Aman 2003 season, conducted in 15 districts under DAE, and the results of 386 demonstration plots of Boro 2002-2003 season conducted in 8 districts. In most of the cases, the result showed a significant yield increase in SRI practice.

He also mentioned some limitations of SRI practice and some ways to overcome these limitations.

Limitations:

- Uprooting seedling from wet seedbed is sometimes difficult
- It is difficult to maintain the transplanting time schedule
- Labor intensity of practices
- Transportation of tiny seedling

Suggestion:

- Prepare seed bed inside or near the crop land
- Use bamboo/plastic tray to transport seedlings
- Use hand-made rake of 30x30 cm to 50x50 cm to maintain line space
- Avoid excessive water and use weeder for weed control.

At the end of his presentation, he shared that SRI is also possible in the Aman season. He reiterated that the farmers, who are the end-users of this practice, are present in this workshop and they should share their experience on SRI as they are the right persons to decide whether SRI is possible in Bangladesh or not. He also informed the house that very recently, Honorable Minister for Agriculture attended a crop-cutting ceremony of an SRI plot in Chittagong where he was amazed to observe



the performance of SRI method. Instantly, the Honorable Minister suggested the DAE officials for wider dissemination of the practice throughout the country. *See more details of the report in Annex 3.*

#### **Fourth Presentation: Farmers' Experience on SRI Practice in Boro 2003 season in Bangladesh.**

Authors: Goutom Sarkar and Md. Mofizur Rahman. Presentation by Mr. Rahman, Technical Officer (Agriculture), CARE Bangladesh.

Objectives:

- Validation of SRI practice in different agro-ecological areas of Bangladesh
- Refinement of SRI principles considering all the factors
- Empower farmers in decision-making process
- Enhanced food security through increasing rice yield

The study was conducted in Rajshahi and Mymensingh region. A total of 265 farm households conducted the study in their own fields in a participatory action research approach in Boro season of 2003. On an average, farmers obtained 17.14% higher yield in SRI plots over the control plots.

Limitations:

Due to poor access of small and marginal farmers to irrigation water, alternate drying and wetting of SRI plots was not possible in some cases. In some cases, farmers were not able to transplant seedlings with an age of 10-15 days due to delay in starting irrigation equipment (DTW).

Lack of skill of transplanting tiny 10-15 days seedling resulted in higher labor requirements in SRI plots during transplantation.

Recommendations:

More participatory action research on SRI practice is required in different agro-ecological zones of Bangladesh to refine and readjust the SRI system considering farmers' own contexts. *See the details of the report in Annex 4.*

#### **Fifth Presentation: Verification and Refinement of the System of Rice Intensification (SRI) Project in Selected Areas of Bangladesh**

Author: Mr. Gopal Chowhan, Executive Director, SAFE. Presented by Mr. Chowhan.

This study was conducted under the IRRI/PETRRRA SRI sub-project (SP 3602), which BRAC, SAFE, SYNGENTA and POSD have been implementing this project in Noakhali, Comilla, Bogra and Rajshahi districts, respectively. A total of 953 farmers from four organizations were involved with the SRI trials in last Boro 2003 season. The results showed that farmers were able to achieve on average, 30% higher production from SRI practice than traditional practice (SRI = 75.75 Mds/acre, traditional practice = 58.04 Mds/acre). Highest SRI yield from one individual plot in Noakhali was 9 tons/ha.

The presentation was concluded with a review of the benefits and limitation of SRI which are given below.

**Benefits:**

Comments on SRI from farmers:

- Although many farmers neglected and mocked at the initial stage, later on they were surprised to see huge vegetation in the SRI field.
- A larger number of tillers produced higher yield (up to 49% over existing practice).
- Rice panicle size was bigger with more grains.
- Insects and disease infestation was less.
- Farmers decided to grow more rice under SRI practice.
- SRI might improve food security situation of the resource-poor farmers.

Comments on SRI from Field extension staff:

- Farmers attitudes in SRI practice look encouraging.
- If farmers get more assistance in organizational and extension support, SRI practice will rapidly increase.
- SRI practice should be popularized through farmers' leadership development.

**Limitations:**

- Some rice seedlings died after transplantation and were not possible to replace.
- Uprooting and transplantation of tiny seedlings is difficult.
- More weeds in the SRI field.
- Inadequate organic manure application.
- At initial stage, it was difficult to get confidence and cooperation of farmers.
- Proper irrigation management was not always possible.

*See the details of the report in Annex 5.*

**Sixth Presentation: Validation of System of Rice Intensification (SRI) in Eastern Part of Bangladesh.**

Authors: M. A. Latif and M. Harun-Ar-Rashid. Presented by Mr. Latif, Coordinator, SRI Sub-project (SP3502), PETRRA and SSO, BRRRI Regional Station, Comilla.

Objectives: To evaluate the components of SRI in Bangladesh environment, and to maximize yield among resource-poor farmers through its verification. Implementing organizations: BRRRI Regional Station of Comilla, and AAS, an NGO.

This set of experiments was conducted in BRRRI Regional Station of Comilla during Boro 2002-2003 season. Another set of farmers' participatory research was conducted in Comilla, Moulvibazar and Habiganj to validate SRI in comparison with BRRRI-recommended and farmers' practice.

Comparative yield and profitability: Some major findings

- Considering overall management, SRI required 12.9% more labor than BRRi practices, and 19.2% more than farmer practices.
- In SRI practices, 25.45% and 35.29% more labor was needed compared to BRRi and farmers practices for weeding, while 22.5% and 27.3% more for transplanting.
- SRI required considerably fewer seeds (8 kg/ha) while BRRi and farmers practices required 30 kg/ha and 60 kg/ha seeds.
- SRI required 47% more irrigation cost than BRRi and farmer's practices.
- SRI practices gave significantly higher yield than farmers' practice in Comilla, but not in Moulabazar and Habigonj.
- SRI and farmers practices showed similar net results, and BRRi practices gave higher net returns.

The presentation was concluded with the following recommendations:

- Spacing for SRI plots need to be maintained at 25x25 cm instead of 40 x 40cm.
- Two seedlings per hill may be optimal instead of single seedling to avoid seedling mortality.
- Low cropping intensive area may be suitable but there SRI can be compared with direct seeding.
- Long-duration rice variety should be preferred.
- As the field duration with SRI is longer, transplanting should be done by 1<sup>st</sup> week of January in Boro season.

*See the details of the report in Annex 6.*

#### **Seventh Presentation: System of Rice Intensification (SRI): A New Rice Production Method for Resource-Poor Farmers in the South-West Region of Bangladesh.**

Authors: A. B. S. Sarker, M. M. Hussain, G. J. U. Ahamed, and A. A. Akter. Presented by Mr. Sarker, SSO, BRRi Regional Station, Barisal and Principal Investigator, PETRRRA SRI Sub-project (SP 3402).

This participatory research and extension has been done under PETRRRA-funded SRI sub-project (SP 3402) by the BRRi Regional Station of Barisal and UTTARAN, a local NGO, on 20 resource-poor farmers' fields in Tala Upazilla in Boro 2003 season. Five different activities were implemented, and these activities were:

- Effect of different rice production methods on grain yield and yield-contributing factors of rice through participatory field experimentation.
- Effect of different principles of SRI on grain yield of rice under farmers' field conditions through participatory field experimentation.
- Effect of different Boro varieties on grain yield under SRI methods under farmers' field conditions through participatory approach.
- Effect of different fertilizer management practices under SRI methods on grain yield of BRRi Dhan 28 in farmers' field conditions.
- Evaluation of omission-plot nutrient management technique for grain yield of BRRi Dhan 28 under SRI methods with farmers' field conditions through participatory approach.

Some major findings:

- Grain yield in SRI method was found significantly higher than farmers' practice but similar to BRRi-recommended practice.

- SRI is beneficial both for resource-poor and rich farmers.
- The highest yield was observed in BRRRI Dhan 29, but farmers preferred BRRRI Dhan 28 and 36 due to their shorter duration.
- Production cost of BRRRI Dhan 29 was higher than that of BRRRI Dhan 28 and 36.
- The result showed that grain yield was affected by time between seedling uprooting and transplanting. Highest grain yield was obtained from the treatments where transplanting time was between 5 minutes to one hour after seedling uprooting.
- Farmers used overdoses of urea. Due to overuse of urea, plants were attacked by diseases and insects.
- It is found that USG is appropriate for their area under SRI. BRRRI + LCC fertilizer also perform well.
- The highest grain yield was observed when all fertilizer was applied.
- Absence of any fertilizer response and grain yield declined by more than one ton/ha.

The presentation concluded with an explanation why farmer will practice SRI.

- SRI is not only to *maximize yields* but rather to achieve *higher productivity* from the factors of production devoted to rice.
- Land, labor, capital and water may be used intensively by SRI.
- SRI increases productivity in ways that benefit of farmers, especially resource-poor farmers.
- SRI is environmentally friendly
- SRI may contribute to sustainability in rice production.

*Please see the details of the report in Annex 7.*

### **Farmers' Experiences with SRI**

In this part of technical session, designated farmers from different parts of country, who are directly involved in the SRI practice with assistance from BRRRI, DAE and different NGOs, shared their experiences one by one.

Two designated farmers from DAE, one from Mymensingh and another from Kishoreganj district, first shared their experiences on SRI practice. Mr. Rostom Ali informed the house that he got 70 Mds/acre yield through practicing SRI, that was much higher than his traditional practice. Mr. Helal Uddin also informed that he was able to gain 8.75 Kg rice FROM only .25 decimal land. Both the farmers expressed their happiness with SRI practice, which according to them proved to be beneficial.

At this stage, one Block Supervisor of DAE, Kishoreganj, shared his experience on SRI as he was one of the pioneers in introducing SRI in Bangladesh. He confidently stated that, though there are still some problems in practicing SRI, this system of crop establishment has been proved as beneficial to farmers.

Mr. Mofiz, a designated farmer from CARE Rajshahi, informed the house that in his village 17 farmers cultivated rice following SRI practice on 40 bighas of land where

they got significantly higher yield than their traditional practice. He expected that, SRI coverage would be at least 100 bighas in his village in the coming Boro season.

Referring to the problem of transplanting tiny seedling, he informed that if the seedling is transplanted carefully in shallow deep saturated plots, the mortality of the seedling would be less than they experienced from last few years.

Mr. Omar Ali, a designated farmer from POSD, Rajshahi, explained that he was at first disappointed with the practice, observing high weed infestation and lower number of tillers at the beginning. But finally he got unexpected result from SRI plots and became convinced about SRI. This farmer had also composed a song on SRI.

Another designated farmer from SYNGENTA, Bogra shared his experience on SRI and also expressed his happiness on the practice.

Mr. Bikash Ghose, a designated farmer from AAS, Srimangal, and another designated farmer from BRRRI Comilla, expressed their negative feeling about SRI. According to them, BRRRI-recommended practices seem better than SRI in yield performance.

Two designated farmers from SRI sub-project (SP3402) of Satkhira shared their experience on SRI, and they mentioned that SRI practice is beneficial for them as they got higher yield from the practice. They also informed that in the coming Boro season, at least 50 farmers in their locality would be involved in the SRI practice. A farmer from Noakhali also expressed his satisfaction at the performance of SRI and informed the house that more farmers in his area would go for SRI cultivation in a much larger area during the 2003-04 Boro season.

At this stage, the session was adjourned for lunch.

### **Open Discussion Session**

After lunch, there was an open discussion session on the presented papers and farmers' shared experiences. The chairperson requested the workshop participants to raise their concerns and to share opinions. The session was very lively, and most of the participants spontaneously participated in the session.

In response to a concern from a BRRRI Scientist regarding deviation in SRI principles, Mr. Mofizur Rahman, Technical Officer (Agriculture), CARE Bangladesh, informed the house that there is no rigid principle in SRI method. Considering the local context, farmers have adjusted the methods as they felt suitable for them. They did it based on their experiences that they learned from implementing trials during last three seasons.

Mr. Kader, SO, BRRRI, Comilla, raised a concern that from the presentation it has been revealed that in most cases, researchers got negative impression from SRI practice, whereas on the contrary, extensionists and farmers found it significantly beneficial to the farmers. There is a distinct gap between the researchers and extensionists. This gap should be minimized through further intensive study and enhanced cooperation.

He also mentioned that the DAE and NGOs have compared the SRI practice with the farmers' practice rather than BRRI-recommended practice. This might be one of the causes of yield increase in SRI method. He suggested to compare the SRI practice with the BRRI-recommended practice.

In response to his concern, Mr. Wasiuzzaman, AD, DAE, Chittagong, said that DAE disseminated the practice that BRRI-recommended and that farmers are already practicing these methods in rice production. He said that the scientists should not think in such a way that the farmers will only follow the BRRI-recommended practices. He also opined that research agenda should be decided based on farmers' problems and demands.

Dr. Musharrof Hossain, CSO, BRRI, raised a concern on the presentation of Mr. Mofiz. He explained that in the presentation of CARE it has been shown that the number of tillers per hill, number of grains per panicle and grain weight been increased simultaneously, which is scientifically not possible. He requested the respective researcher to explain the issue. [Note: see comment to Prof. Uphoff below]

In response, Professor Muazzam Hussain informed the house that sometimes the plant may produce results even beyond its presently recognized genetic potential, and there are specific scientific causes behind that. He also informed that Professor N. Uphoff could explain the issue more scientifically. However, he assured the house that the explanation on the issue given by Prof. Uphoff would be circulated later on to the respective participants.

Dr. Hamid expressed his concern on polarization of views among researchers and extensionists on the issue of SRI. This polarization should not exist for the betterment of the farmers, he mentioned. He opined that SRI might be a good method for seed multiplication.

Referring to the issue of high rate of seedling mortality in SRI practice, Dr. Hamid suggested the scientists work on the issue for finding out the causes of high seedling mortality. He also suggested working on flowering synchronization in SRI practice. Further he suggested for testing the effectiveness of drum seeder in SRI practice.

Finally he mentioned that 9 participants out of 10 farmers expressed their happiness on SRI practice, but the researchers expressed negative feeling. This issue should be resolved through concerted efforts from all concerned.

In response to a concern from Dr. Ghani of IRRI regarding SRI practice in *Aman* season, Professor Muazzam assured him that all SRI sub-projects are testing this method in *Boro* season only according to project mandate. DAE and some other NGOs are testing this method in *Aman* season.

Mr. Abul Hasnat, Deputy Director, DAE-Sirajganj, said that according to farmers' opinion, SRI has been proved as a beneficial practice for the farmers. Citing an example on land crisis for seedling raising, he suggested exploring the use of direct seeding technology for rice production.

Mr. Enamul Haque, DD, DAE, opined that the SRI is a sophisticated method of crop establishment, and this deserves further investigation to locate the best possible areas for SRI practice and making adjustments of the system considering local context. He also suggested that direct seeding is not possible in SRI method. The

technical session was concluded with the speech from Dr. A. R. Gomasta, chairperson of the session.

In his speech, Dr. Gomasta mentioned that the SRI is a concept; it is not a new technology. He explained the interest of researchers in different yield-contributing factors in the SRI system. He mentioned that it is usual that researchers would be interested to investigate how a young-aged tiny seedling can contribute to increased yield in rice. Further he said that if farmers are getting higher yield through SRI practice, it is the responsibility of researchers to find out what factors that are contributing to the increasing yield. He firmly expressed that the researchers who have been working on the issues will continue further as required.

He also mentioned that if any new technology is proved beneficial to farmers, they will adopt that technology, no matter whether the researchers or extensionists recommend that technology or not. Citing the example of hybrid rice, he said that it is better to validate any new technology by BIRRI to avoid loss to farmers. At the end he called upon to all concerned to work more on the SRI issue. He declared the session closed with thanks to all participants.

### **Review Session and Future Plans**

The last session of the workshop started with Mr. Wasiuzzaman Akanda, AD, DAE, Chittagong in the chair. The chairperson first rendered his thanks to the organizers for giving him the opportunity to chair the session and welcomed the participants to the last session of the workshop. He then invited Mr. Indu Bhushan Roy to facilitate the session.

The facilitator divided all participants into three groups, ensuring representatives from farmers, scientists, DAE and NGO officials in each group. All the groups were requested to discuss among themselves the benefits and limitations of SRI practice. The groups were also requested to provide recommendations for addressing the limitations of SRI and chalk out future plans to carry forward the SRI activities. Accordingly the individual groups sat together and discussed the above-mentioned issues on SRI. Farmers were especially encouraged to freely express their opinions in the groups. A lively and fruitful discussion took place in each group. There was a plenary session after tea break, and one member from each group presented its findings in the plenary. In between tea break and plenary session, a farmer from Rajshahi sang a song (*Jarigan*) on SRI, which he had composed himself.

The findings of the group discussions are stated below:

#### **Group: 1**

Presented by Ms. Anjuman Ara Akter, Program Officer, UTTARAN

Benefits from SRI practice:

- Less seed requirement
- Easy weeding due to wider plant-to-plant spacing
- Less requirement of chemical fertilizers if organic fertilizer is applied
- Comparatively less attack of insects and pests
- High number of tillers/hill
- Number of filled grains is more and comparatively less number of unfilled grain
- Higher yield? (not all group members, especially BIRRI scientists agreed on this)
- Less irrigation requirement

Limitation of SRI practice:

- High labor requirement in seedling uprooting and transplanting
- High labor requirement for weeding
- Irrigation management is difficult and required higher frequency of irrigation
- High cost in land preparation
- Unavailability of organic fertilizers
- SRI is not suitable for all kinds of land

Recommendations and future plan:

- Extensive training to increase SRI skills
- Integrated efforts from farmers, researchers and extensionists (GO and NGO) to
  - identify the causes of higher/less yield
  - test land feasibility
  - define suitable time/period for transplanting and seedling raising
  - compare SRI practices with farmers' and recommended practices

**Group: 2**

Presented by Dr. M. A. Mazid, PSO and Head, BRRRI Regional Station, Rangpur

Benefits:

- Less requirement of seed
- Comparatively less requirement of irrigation water
- Higher yield
- Easy to control weeds
- Suitable for seed multiplication
- Less seed cost
- Feasible for resource-poor farmers
- Higher rate of soil aeration and more exposed to light
- Reduced pesticide cost
- Help to improve soil structure

Limitation:

- Land preparation cost is high
- Not feasible for low-lying land
- Irrigation management is more difficult
- Seedling mortality rate is high
- Insect infestation is high in maturity period
- High level of weed infestation

Recommendations:

- Arrange for soil testing to define appropriate fertilizer doses
- Introduce mechanized cultivation
- Community approach is required for wider dissemination
- Avoid low land in Aman season
- Use seed bed cover for seedling raising
- Early transplantation

Future plan:

- DAE-farmers-NGOs-researchers-joint validation of SRI through joint planning, implementation, monitoring, crop-cutting and reporting.
- Awareness build-up and training (leaflet, booklet etc)



### **Group: 3**

Presented by Mr. Mizanur Rahman, CARE Rajshahi.

#### Benefits:

- Lower requirement of seed
- Less labor requirement in seedbed management
- Higher number of effective tillers/hill
- Higher yield
- Good aeration of soil and crop and more exposed to light
- Increased soil fertility
- Number of quality grains/panicle is high

#### Limitations:

- High labor cost
- High level of weed infestation
- Flowering and maturity time is not synchronized

#### Recommendations:

- Use herbicide in SRI plots
- Define area-wise suitable variety, best time for seedling raising and transplanting
- Practice SRI in whole plot rather than in a small part of a plot
- Introduce community approach for SRI
- Continue SRI activities jointly with all concerned

#### Future plan:

- Search for assistance from donors for continuation of SRI experiments
- Organize training for farmers as well as for extension workers
- Organize workshop at upazilla, district and national levels
- Arrange cross-visits, field days and seminars on SRI
- Enhance media coverage for wider dissemination

After plenary, the chairperson called upon all concerned to work jointly to carry forward SRI activities in Bangladesh. He mentioned that about 22 countries in the globe have been working on SRI, and we should put efforts to keep pace with them. He then concluded the review and planning session with thanks to all participants.

The workshop came to an end with the concluding speech from Professor Muazzam Husain, National Coordinator, SRI. Professor Muazzam expressed his satisfaction for the enthusiastic and fruitful participation of all participants in the workshop, and he rendered his cordial thanks to all. He was glad that a good number of representative farmers attended the workshop. They are the people to finally decide, based on their own experience and knowledge, regarding SRI adoption. Professor Muazzam also pointed out that if farmers do not adopt an apparently beneficial technology, it is the responsibility of scientists to find out the causes of non-adoption.

Further he mentioned that SRI is not a rigid system. It was never claimed that SRI is a technology; rather it is an integrated production management system. In SRI system, farmers are in the centre of experiment, and farmers are expected to make their own decisions.

He firmly expressed his view that SRI is an integrated system, and it deserves integrated and careful experimentation. It would not be appropriate to experiment with single or fragmented components of SRI system. He indicated that still we have

some ambiguity on the SRI system, and that we need to have clear understanding of the concepts. He suggested that we should not try to take any final decision on SRI based on only one or two years of experience. He believed that SRI has high potentiality in our country and we need to explore that potential.

At last he emphasized on the requirement of a new national committee to carry forward the SRI initiatives in future. In response, the workshop participants suggested to continue with the existing Steering Committee for launching and coordinating new action programmes on SRI in Bangladesh.

Finally the workshop was concluded with a vote of thanks.

### **ADDENDUM from Prof. Norman Uphoff, CIIFAD**

Having read this report of the national SRI workshop held December 2003, which I was unexpectedly unable to attend, I am all the more sad to have missed this event. There was obviously a lot of rich experience and good thinking that has gone into this effort to assess SRI under Bangladesh conditions. At several points, my thoughts on certain subjects were invited in the workshop, so I will add a few comments.

1. The suggestion that it is **not possible for number of tillers, size of panicles, and grain weight to all increase together** reflects a view found in the literature -- that there must be some 'tradeoff' among these components of yield. SRI is proving this view to be wrong. This is 'zero-sum' logic, modeling what happens to the rice plant when its roots have degenerated due to continuous flooding and hypoxic conditions. With SRI management methods, the root systems survive and function to the end of the growing period, making the plant an 'open-system' rather than a 'closed system' which must necessarily make tradeoffs. Scientifically one of the most interesting aspects of SRI practices is that they reverse the negative correlation reported in most of the literature, showing that positive correlations are attainable, and that previous thinking in terms of a yield ceiling is due for revision.
2. That **researchers take a more negative view of SRI** than extensionists and farmers do is not surprising because we have seen in a number of countries that SRI produces lower yields on-station than on farmers' fields. When IRRI first tried SRI methods at its HQ farm at Los Banos in the Philippines, the yield was 1.44 t/ha, while the Department of Agriculture's Agricultural Training Institute in trials on Mindanao, evaluating three different varieties, got an average yield of 12 t/ha! We do not have a sufficient explanation for this yet, but my hypothesis is that most experiment stations have moribund soils after many years of:
  - (a) **monoculture**, growing the same crop, season after season, so that always the same profile of root exudates are put into the soil, supporting thus less diversity in the soil biological communities, and
  - (b) **application of chemicals** (fertilizers, insecticides, fungicides, herbicides, etc.) so that the abundance of soil biological life is reduced and even suppressed. SRI practices enhance, we are pretty certain, the abundance and diversity of soil biota, which contribute to the enhanced performance of SRI rice plants. This is the best explanation we can propose of why research stations often can't make SRI methods very productive. Many researchers then dismiss SRI, assuming that if it doesn't work for them, it doesn't work at all. But they should note that it is working on farmers' fields.

3. It is still a puzzle to me why **SRI yields are generally lower in Bangladesh** than we are seeing in some other countries, even in South Asia. In Andhra Pradesh, this past kharif season, about 300 comparison trials were done on farmers' fields, overseen by the agricultural university or extension service. Practically all were successful for SRI (only those on saline soil did not show any superiority). The first dozen crop cuttings showed 4.3-6.3 t/ha yield with conventional methods; 8.5-12.2 t/ha for SRI methods. These were with short-maturing varieties. When medium to long-maturing varieties were harvested, the SRI results went up to 15.75 t/ha. I think that climate may have something to do with this, as the more extensive inundation in Bangladesh may favor anaerobic soil organisms over aerobic ones. This is an area for investigation as nothing definite has been shown.
4. It was commented very briefly that **SRI grain quality is better**. In Andhra Pradesh and Sri Lanka, grain millers have noted that there is higher outturn from SRI paddy, so they are willing to pay a higher price per bushel (volume) since their product is valued in kilograms (weight), and they that SRI paddy has fewer unfilled grains (less chaff) and fewer broken grains from milling. The outturn figures I was given when in Andhra Pradesh in January was an increase from 67% to 75%. So in addition to higher yield, there is higher value of yield -- along with lower costs of production. Which makes SRI more attractive. For a variety of reasons that I do not fully understand (see 3. above), SRI is not as profitable yet as we are seeing in India or Sri Lanka. An IWMI evaluation of SRI in Sri Lanka found that net profit increases 100-200%. Even the favorable evaluations of SRI in Bangladesh do not reach this figure. Certainly the negative or null assessments of researchers are not consistent with results attained with SRI elsewhere.
5. On **labor intensity**, SRI is more labor-intensive to begin, when farmers are learning the new techniques. There is always some 'investment' required in any technological change. But in this case, it is time and effort, not capital. By the second, third or fourth season, when the techniques have been mastered, SRI no longer requires more labor per hectare, and indeed for many farmers, it becomes **labor-saving**. What is reported so far in Bangladesh is how much more laborious SRI is. In Andhra Pradesh, when I have asked farmers about this, they mostly shrug it off as something passing. Indeed, one farmer whom I visited (having heard from Andhra Pradesh government researchers the day before that farmers could not and would not transplant seedlings any younger than 15 days old) showed me proudly his two SRI plots, one with rice transplanted at 10 days, and the other transplanted at 5 days. The latter was his own idea. He said it was not much more work, and he was very proud of the vigorous plant growth. In Cambodia, 70% of a 154 SRI farmers interviewed at random reported that for them, SRI was already labor-saving. So the assessment of SRI in this regard in Bangladesh is a little puzzling. We do not and should not try to hide the fact that SRI requires some initial investment in learning, but SRI need not be intrinsically labor-intensive. Also, farmers in India, Sri Lanka and elsewhere are innovating with the SRI methods, devising better markers (for transplanting in square pattern) or weeders to save time. So with farmer initiative, we expect that SRI will become less labor-demanding over time.
6. On **seedling mortality**, there may be problems with soils in Bangladesh that makes this more of a problem there than we have seen elsewhere. This does not make it less of a problem for Bangladeshi farmers, only it should be understood that this is not intrinsic to SRI methods.

7. On **planting young seedlings**, this can surely be a problem, but it is partly or maybe even largely psychological. I have been impressed that farmers in Andhra Pradesh are not making complaints about this. I noted above the farmer there who on his own planted 5-day-old seedlings, he said without difficulty. Much of this is a matter of mentality/motivation and of acquisition of skills through practice.
8. On the suggestion of **planting two seedlings** instead of just one, this may be more productive in some circumstances but there this works better, it is an indication of soil deficiencies, as with good fertile soil, one plant invariably outperforms two and certainly three.
9. On **synchronization** of flowering and ripening, this problem is also not commonly reported in other countries with SRI. I am puzzled that this is a problem in Bangladesh. This is something to be studied where it does occur, but farmers should not assume that it is intrinsic or necessary with SRI.
10. **Direct seeding** will probably become the main method of crop establishment for SRI in the future. There have been some experiments so far which are very encouraging, unless the spacing was too wide, leading to problems of weed control. We encourage farmers to experiment with such alternatives, and farmers in Cuba have begun designing SRI planters for using germinated seed, one designed for 12 concurrent rows, to be ox-drawn.
11. On **duration of varieties**, we find SRI working well with short-, medium- and long-term varieties. More time for maturation means higher yield when the crop is harvested. But there can be opportunity costs for a long-term variety compared to a short-term one when there other cropping season alternatives. A comment was made that SRI plants take longer to mature. We have not found this as a rule, and often we find the opposite. In Andhra Pradesh, a number of the comparison trials found SRI plants maturing up to 10 days earlier than the control, with higher production.
12. On **season**, we have found the SRI methods working in summer or winter season, in wet or dry season. Researchers would do well to evaluate the yield and profitability differentials, but they should not dictate farmer practice. SRI as a rule will do better where there is better water control, which often means lift rather than canal irrigation.

There are other points that could be addressed, but these comments give some feedback based on experience with SRI in other countries. There is a very excellent combination of institutions already mobilized into the national SRI network. I with its success in assessing and adapting SRI to Bangladesh conditions, and in evolving SRI to where it becomes even more productive in meeting the needs of rural households, which aggregate to represent the needs of the nation.