Experience with SRI Methods in BANGLADESH

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In Bangladesh, meeting the food needs of a growing population of 129 million is a continuous challenge to the government and the farmers of our country. The climate is dominated by typical monsoon weather pattern with high to fairly high rainfall and equable temperature. Eighty percent of Bangladesh's land area consists of flat alluvial flood plains with more elevated hilly areas located in the northeast and east. Agriculture is the primary economic sector employing around two-thirds of the labor force, and rice, the staple crop, occupies 75% of the total cropped area.

Over the last three decades, the production of rice has doubled, and yield has increased with greater adoption of the modern technology with high-yielding varieties (HYVs). However, with population growth and consequent shrinking of cropped area, the arable land per capita is declining. The growth rate for rice production needs to be further enhanced to meet the growing demand for food and to release labor, land and water resources for other uses. The dependence of HYV technology on chemical fertilizers and pesticides raises production costs and also leads to ecological problems that pose a threat to the sustainability of agriculture in the country.

Spreading Institutional Involvement with SRI

A number of different institutions in Bangladesh have come to know about the System of Rice Intensification (SRI) developed in Madagascar either through literature on SRI or through direct contacts. **CARE/ Bangladesh** first learned about SRI through its participation in a conference on sustainable agriculture at Bellagio, Italy, in April 1999 where Prof. Uphoff presented a paper on SRI. This paper was subsequently circulated by CARE within Bangladesh, and it reached the government's **Department of Agricultural Extension** (DAE) whose director-general encouraged DAE district directors to try out the new methodology.

The **Bangladesh Rice Research Institute** (BRRI), the government's agency for improving rice production, was encouraged by DAE to take up SRI trials, and **Syngenta Bangladesh Ltd.**, a private company, in turn learned about SRI from the director-general of BRRI. The **Bangladesh Rural Advancement Committee** (BRAC) learned about SRI from Prof. Uphoff when he visited its headquarters in December 2000 and talked to agricultural staff about the new methods, also giving this talk on SRI to CARE staff in Dhaka and to BRRI researchers at their headquarters in Gazipur.

The SRI technique attracted the interest of a number of researchers, extension personnel and NGO practitioners. The first trials evaluating the performance of SRI began in the 1999-2000 *boro* (dry) season through CARE. It was already conducting farmer field schools in different parts of the country to improve irrigated rice-based farming systems with an IPM component. Adding SRI evaluation to its ongoing program of farmer-centered research and dissemination was easy. These trials were conducted in Kishoregonj and Rajshahi districts, with efforts extended subsequently to Mymensingh district. DAE also initiated trials in 1999-2000 with 54 farmers in Kishoregonj, and it has plans to involve farmers in 20 other districts.

BRRI started trials at its Comilla station in the 2000 *aus* (middle) season and then on its research farm in Gazipur later in that year. Syngenta encouraged trials with contract seed growers in the district of Bogra during the 2000 *aman* (wet monsoon) season and continued its trial during the next year. BRAC began its trials during the 2000-2001 *boro* season in Habigonj and ex-

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tended its trials on some of its own farming area in Faridpur and Gopalgonj districts during 2001-2002 *boro* season. It hopes to go for farmers' field trials from next year.

CARE and DAE have done all of their evaluations of SRI in farmers' fields. Only Syngenta and BRRI have conducted trials during the wet *aman* season. Others have conducted their trials during the dry winter *boro* season when irrigation control is better, considering this essential for SRI. All these organizations expanded their trial areas during 2001-2002 due to the favorable initial results obtained.

Evaluations

Summary information is presented in Table 1 on these various trials, including information on practices followed, area cultivated, the number of farmers involved if any, period of trials, seasons, and varieties used. Generally, evaluations started by using the recommended set of SRI practices, but later specific components were tried and their results evaluated. CARE started by trying out general SRI practices, comparing the results with those of local farmer practices. Then during the next year, farmers evaluated certain components of the SRI method: seedling age, and spacing. In trials on the effect of seedling age: 10-, 15- and 20-day-old seedlings were tested at 30x30 cm spacing; in spacing trials: 30x30 cm, 35x35 cm and 40x40 cm spacings were tested with seedlings aged 12-15 days. In its evaluations, DAE promoted use of the standard set of practices of SRI on farmers' fields in order to see the resulting yields and other advantages of SRI.

BRRI at Gazipur has not been evaluating the SRI practices as a package but has focused on just some of them, varying seedling age and spacing. This can miss the synergistic effects possible when the full set is used. BRAC has followed the set of practices recommended for SRI to evaluate their results, including yield gains and relative costs and returns of SRI. Both BRAC and Syngenta have decided to go for farmers' trials during the ensuing cropping season. The trials in Bangladesh have been done on a variety of plot sizes and most without replications, so from a scientific point of view, no consistent or reliable estimates can be made yet about the overall performance of SRI in the country.

Results

Overall yield performance of the different trials during the *boro* season has been encouraging. Yield improvements ranged from 30-40% in the case of farmers working with DAE, 11-34% for farmers working with CARE, and 26% for BRAC on its own fields. Only BRRI experiments have not found any significant yield increases with SRI over other practices. Yield per hectare varied from trial to trial and from area to area. Seed and irrigation costs were generally less under SRI practice. According to BRAC figures, irrigation costs under SRI practice were 28% less than with traditional methods of cultivation.

Learning

- Farmers have found it difficult to pull up very young seedlings from the seedbed and to transplant them. Further trials are being carried out to improve this part of the cultivation process.
- During the winter *(boro)* season, seedling growth is very slow. So young seedlings less than 10 days old face more damage than older seedlings. In cold areas, recommended seedling age may thus may to be raised to 10-15 days for SRI practice. Farmers in some areas have transplanted seedlings accordingly.
- Water management during the monsoon *(aman)* season is difficult due to flooding caused by heavy rains. During this season, SRI could be tried only in high and medium high lands that have good drainage systems and in regions with less rainfall, such has Rajshahi and Jessore regions. Having good water control will remain a problem for SRI use in many parts of Bangladesh.
- Availability of adequate organic matter has been a problem in introducing SRI practices. The awareness of farmers of the value of such inputs needs to be increased, and training and motivation provided, to get more preparation and use of organic matter in SRI rice fields.
- Wide spacing and periodic drying of the field led to high weed growth. Cost-effective, ecologically sound and acceptable methods of weed control need to be evolved and practiced.

Prospects

- Encouraging results of the trials conducted in Bangladesh and gradual expansion of trial areas indicate that there are favorable prospects for adoption and use of SRI in Bangladesh
- The trials so far conducted cannot be termed as conclusive. Well planned, coordinated sets of trials and evaluations need to be undertaken. At a workshop 14 January 2002, organized at the initiative of Prof. Uphoff and hosted by BRAC, the participants from all the organizations working with SRI resolved to form a Working Group that would coordinate, facilitate and strengthen future programmes of SRI activity in the country.

- A five-member Steering Committee was formed to act on behalf of the Working Group which can plan and coordinate the conduct of ongoing trials and evaluation on SRI. At the January workshop, the IRRI representative in Bangladesh who is managing the DFID-funded PETRRA project encouraged preparation and submission of a proposal to fund evaluation research on SRI by the group.
- A concept note is being prepared on behalf of the Working Group for submission to the PETRRA project to support evaluations of SRI techniques to determine the most suitable methods for an improved and sustainable agricultural production technology that will raise incomes, improve livelihoods, and contribute to poverty elimination in rural Bangladesh. The evaluation research will seek to enhance the productive potential of rice-based farming systems in Bangladesh.

Table 1. Results of SRI practices when used by different organizations in Bangladesh, 1999-2001

Institution	Season	Area	Seedling age (days)	Spacing (cm^2)	Farmers	Variety	Fertilizer	Yield
CARE								
Kishoregonj and Rajshahi	1999-2000 *boro*	0.21 acres	–	–	21 farmers	12 HYVs	Chemical fert.	6.53 t/ha (av.)
	2000-2001 *boro*	1 acre	10-20	30x30 to 40x40	99 farmers	HYVs	Same	6.25 t/ha (av.) (4.8-7.2 t/ha)
DAE								
Kishoregonj	1999-2000 *boro*	2 acres	9-18	30x30 to 50x50	53 farmers	HYVs	Chemical fert.	7.5 t/ha 30-40% higher (5.2- 9.5 t/ha)
2000-2001 *boro*		increased	14-17	35x35	80 farmers	Same	Same	Similar
BRRI								
Gazipur	2000 *aman*	$80m^2$	15	40x40 to 50x50	Own research plots	HYV, HR	Chemical fert.	No significant yield variation observed
	2000-01 *boro*	$180m^2$	15	Same	Same	Same		
Comilla	1999-200 *boro*		15	NR	Same	Same	Chemical fert.	5.4 t/ha. vs. 4.4 t/ha with same variety & usual methods
Syngenta								
Bogra	2000 *aman*	0.2 acre	12	20x15 to 50x50	Own research plots	HYVs	Chemical fert.	4.9-5.61 t/ha
	2001 *aman*	same	12	20x15 to 30x30	Same	HYV	Same	5.25-6.15 t/ha
BRAC								
Habigonj	2000-01 *boro*	10 acres	15	25x25	Own farm	HYV	Chemical fert.	5.9 t/ha; 26% higher