

**REPORT ON A VISIT TO NEPAL'S MORANG DISTRICT, NOVEMBER 2-5, 2006,  
TO REVIEW THE STATUS OF SRI ACTIVITIES THERE, FOLLOWED BY  
OTHER SRI ACTIVITIES IN NEPAL – NORMAN UPHOFF, CIIFAD**

1. Nepal was one of the first countries outside of Madagascar where SRI methods were evaluated, starting in 1999. The initial results were not very encouraging, however, perhaps because there was not adequate water control so that aerobic soil conditions could be maintained. From 2002 on, fortunately, better results began to be reported, notably from the Sunsari-Morang irrigation project where a NEDECO technical assistance team and a cooperating Nepali NGO undertook to introduce and evaluate SRI methods through farmer field schools. SRI yields averaged 8.28 tons/hectare over two seasons, compared with 6.01 tons from 'improved' practices including use of chemical fertilizer, and 4.29 tons with farmer practice.
2. When that project ended, the District Agricultural Development Office (DADO) in Morang district undertook further evaluation and dissemination, starting with 100 m<sup>2</sup> demonstration plot in 2003 and extending SRI to >2,000 farmers in 2006. The leadership of Rajendra Uprety in the DADO-Morang office, who hosted my field visit and arranged meetings and seminars in Kathmandu, has been instrumental in the spread of SRI within and beyond Morang district.
3. The government's Department of Agriculture, Department of Irrigation (DOI), and Poverty Alleviation Fund (PAF, with World Bank funding) are now supporting SRI dissemination and indicate that they will expand their efforts. That SRI methods are increasing yields by 50-100%, or even more, is sufficient incentive for this, although there are other benefits in addition.
4. That SRI can be spread rapidly is seen from the Praganna irrigation scheme in Dang district, where the DOI has spread SRI farmer-to-farmer. The effort started with two demonstration plots on 0.13 ha. Their yields of 9.72 and 11.25 t/ha, respectively, led to SRI utilization on 67 hectares the next year, with high farmer satisfaction, according to the engineer in charge of the system. There as elsewhere, farmers reported that SRI methods *reduce* their labor requirements, so SRI need not be labor-intensive, as widely believed.
5. The most significant thing seen during the visit, of much scientific and practical significance, is that SRI methods are *reducing the length of rice crop cycles -- by one, two, three, even four weeks -- while giving higher yield*. Data from Morang support observations made in Madagascar and elsewhere that using young seedlings (the younger, the better) and aerating the soil as part of weed control operations (the more, the better) not only raises yield but speeds up crop maturation. This has important implications for reducing water requirements, for reducing crop exposure to late-season losses due to pests or storm damage, and making land available sooner for planting other crops. This makes an additional vegetable crop more feasible, or a following wheat crop can be planted sooner, naturally enhancing wheat yield within rice-wheat farming systems.
6. A great discovery during the field trip was a simple weeder that one farmer had made himself for 15 rupees (20 cents US). This, he said, has cut the time required for weeding his SRI rice by 60-65%, compared with manual hand weeding. This is one of the most cost-effective implements imaginable. Specific information on this weeder and other aspects and consequences of the introduction of SRI methods into farming systems in Nepal is given in the trip report that follows.

## Background

While Nepal was one of the earliest countries to which the System of Rice Intensification (SRI) was introduced, it was one of the later ones for observing and documenting ‘the SRI effect.’ In 1998, **Chiranjivi Adhikari**, an agronomist at the government’s Khumaltar research farm undertook some on-farm trials at Sipaghat in Kavre District in the hill regions of Nepal, encouraged by Prof. John Duxbury of Cornell University. The results were not very encouraging, however, apparently due to lack of water control. The next year, trials were continued at Khumaltar station and in on-farm trials around Bhaktapur, but these also produced no evidence of the kind of benefits that SRI had been conferring on farmers in Madagascar. So official interest in SRI was dampened.

In summer 2001, Shyam Shrestha in cooperation with the NGO Appropriate Technology Asia (ATA) did some SRI trials at Sunrise Farm at Sitapaila near Kathmandu, as did the National Wheat Research Program at the government’s Bhairahawa research farm in the terai. These results were also not particularly impressive. However, further NWRP trials conducted at Bhairahawa the next year by N. B. Neupane and associates showed a 30% yield advantage with SRI.

Up through 2002, therefore, SRI results in Nepal could be characterized aptly as ‘mixed.’ We were starting to understand better how much the SRI effect depends upon the mobilization of soil biological factors. This pointed to a conclusion that perhaps SRI methods might confer little or no benefit under Nepal’s soil and climatic conditions.

Then in 2002 and 2003, a technical assistance team headed by Bob Davey for the consulting firm NEDECO, which was helping to implement the Sunsari-Morang irrigation management improvement project funded by DFID, evaluated SRI methods. These were compared with ‘improved practice’ which required row planting, chemical fertilization, etc., and with farmer practice which involved random transplanting, limited or no soil amendments, etc. This evaluation could be done through the Farmer Field Schools that the project had organized among farmers at 15 locations within the Sunsari-Morang project area, at head, middle and tail. The average yields obtained from two years of trials were as shown below:

Treatment	Farmer practice (t/ha)		Improved practice (t/ha)		SRI practice (t/ha)	
	2002	2003	2002	2003	2002	2003
	4.38	4.2	5.81	6.21	8.07	8.48
Average	4.29		6.01		8.28	

These results, based on more systematic trials, and more comparisons, than had been done before, also under more realistic on-farm conditions, indicated that SRI methods can indeed be beneficial in Nepal. But such knowledge does not necessarily translate into the uptake of an innovation. That is a very different and usually difficult process.

After my previous visit to Nepal in April 2002, a number of NGOs and other organizations formed a Nepal SRI network. Its list-serve, thanks to the coordination efforts of Andreas Jenny (SAGOAL), has been one of the most active and collaborative of any of our SRI networks. Chris

Evans of Appropriate Technology Asia, working with Shyam Shrestha, put together some excellent illustrated extension materials for SRI in Nepali language, and the International Centre for Integrated Mountain Development (ICIMOD) based in Kathmandu introduced and evaluated SRI in the Jhikun Khola watershed in Kabrepalanchok district under its PARDYP project, also starting in 2002.

As considerable experience with SRI had accumulated by December 2005, ICIMOD on behalf of the SRI-Nepal network hosted a national workshop to share experience and results, with reports from eight districts. Most reports had favorable results to present, although some of the core SRI practices like wider spacing and younger seedlings were not always confirmed in factorial trials, perhaps reflecting particular soil or climatic conditions and constraints in Nepal.

From the reports to this workshop, it could be seen that Morang district, the leading rice-growing district in Nepal, was the district where SRI was spreading most rapidly among farmers.

**Rajendra Uprety** in the District Agricultural Development Office (DADO) there was utilizing participatory extension methods very effectively to spread SRI use, having started from just one farmer trying out the methods in 2003 on a trial plot of 100 m<sup>2</sup>. Next year, >400 farmers began using SRI. I was able to make a small grant to Rajendra to support his efforts, drawing on a grant that CIIFAD had received from the Triad Foundation in Ithaca, NY. In 2005, the number of SRI users reached >1,400; and in 2006, this number was >2,000.

Since I was planning to come to Nepal to participate in an international seminar in Kathmandu, November 6-7, I came a few days early, to see what was going on in Morang district. Rajendra met me at the Biratnagar airport when I arrived in the late afternoon on Thursday, November 2. That evening I joined his family in a celebration of his son's birthday, a nice way to start the visit.

### **Village Field Visits**

Next morning, Rajendra took me on an extensive 'circuit' around Morang district, accompanied by his DADO colleague **Sagar Bhattarai**. Our first stop was at the home of **Rudra Prasad Phayel** a few kilometers north of Biratnagar. Rudra's SRI plot surrounded his house. The 550 m<sup>2</sup> that we walked around was all the rice land that Rudra has. His plants were nearing maturity, and Rudra estimated he will get 5 t/ha from the crop, compared with typical yields in the surrounding area of 2 t/ha. This was particularly good considering since he has no access to irrigation, and his is a rainfed crop.

Rudra had put on considerable farmyard manure (FYM), at a rate of about 9 t/ha. Given the relatively high cattle population in the area, he said that acquiring this much was not difficult. He also applied 1 kg of zinc sulphate, but no pesticides. Grain filling was very good, although I noticed some false smut. He said that what little disease there was at this stage will have no effect on yield.

This season was one of delayed and reduced rainfall, even drought conditions for many farmers. The weather had reduced both rice area planted and crop yield. But those who had used SRI practices were in better position than other farmers as their rice plants are growing better. Rajendra said that SRI yields on smaller areas, if carefully managed, are reaching 11-13 t/ha; however, on larger areas, the top yields are in the 7-9 t/ha range.

**Hattimudha:** Our next visit was to the Hattimudha Village Development Council (VDC) area, still farther north from Biratnagar. It had been visited earlier in the season by John Duxbury and Julie Lauren from Cornell. The NGO **Community Development and Resource Centre (CDRC)** had been working here with farmers on integrated agricultural and rural development for several years, and it had taken on SRI as one of the innovations to be evaluated and promoted. The head of the CDRC assistance team, **Lokendra Karki**, met us and showed us around.

The farmer whose rice fields we visited first, **Krishna K.C.**, who said that he had used SRI for three years, declared himself “very satisfied” with the methods. The first time he had gotten a 4.8 t/ha yield, and he got 7.2 t/ha the next. He said that the labor needed now for transplanting SRI seedlings is no more than with his previous methods. At first, he said that weeding with SRI took more time -- he starts weeding one week after transplanting and does three weedings (good practice). Now the total time required for weeding is not much different from before. When he first planted basmati rice in the previous year, he needed tripled labor for this operation because the seedlings were so small, and everyone was worried about handling them. However, now SRI does not require greater labor, he reiterated. “More and more are now trying SRI,” he said, pointing to his younger brother who was with us and nodded agreement.

Krishna had planted a legume (mung bean) before this summer’s rice crop, and he said that this is benefiting the crop. He transplanted 12-day seedlings and said that he will be harvesting his crop (Bansdhan, a 145-day variety) at 120 days, saving more than 3 weeks of time. This will reduce the risk of crop loss to pests or diseases and to end-of-season storms. There had already been a severe storm here a few days previously. Almost all of his SRI crop escaped damage, the exception being a part of his field that is low-lying and not well-drained.

I suggested that he try wider spacing as his soil is probably becoming more fertile with his SRI practices. He agreed and took me to a plot where he was already doing some experimenting. On this plot he transplanted ‘solarized’ seedlings, raised with a method that Duxbury and Lauren have been working on with researchers and farmers in several South Asian countries. This involves covering the seedbed for rice seedlings with a clear plastic sheeting for three weeks before the seedbed is sown. Solar energy raises the temperature of the seedbed soil to 70 degrees or more, eliminating most soil pathogens. This enables farmers to produce what are being called ‘healthy seedlings,’ free of nematodes and other organisms that can impede subsequent growth.

Krishna’s plot with solarized seedlings had not been transplanted in a square pattern as with SRI, and parts of it had lodged considerably during the recent storm. The crop’s maturity was about two weeks behind the adjoining SRI plot, so it was not performing as well. However, Krishna said he is pleased with the ‘healthy seedling’ effect, and if he combines seedbed solarization with SRI cultural methods, he expects to get an additional 50% benefit. As we walked back toward the car, Krishna pointed out a severely-lodged plot in which he had used 2-month-old seedlings.

As we walked around the fields, Lokendra commented that he was “learning a lot” from his experience in the village. I told him that I was impressed with the evident level of farmer interest here, and Lokendra commented that in his training at the university, he had read two of my books on “instructive experiences in rural development,” *Reasons for Hope* and *Reasons for*

*Success*, written before my attention became focused on SRI. He said that these books had been helpful in preparing him for grassroots-level work.

The Hattimudha farmers next showed me a set of 12 trial/demonstration plots with different rice varieties, many newly released by the National Agricultural Research Council or the Institute of Agricultural and Animal Sciences at Rampur or by LIBIRD, a Nepali NGO that does farmer-participatory varietal development. Also there were a few varieties not yet released.

Several of the new varieties being tested were 100% lodged as a result of the recent rainstorm. I pointed out that varietal performance can be quite different between conventional practice and SRI practice, however, so they should not assume that a variety which does not do well in their trials here with standard cultivation methods will not perform well if grown under SRI.

The farmers were interested in discussing whether SRI methods could be adapted for direct-seeding, and I told them about farmers in China, Cambodia, India and Sri Lanka who are making direct-seeding adaptations to SRI methodology to avoid the labor costs of transplanting. I said that if I were myself a farmer with a very small area of rice land, I would transplant -- to get the maximum benefits from SRI methodology. But if I were a larger farmer with more land, I would choose to direct-seed, trading off some possibly attainable yield in order to reduce my labor costs.

I emphasized that SRI is not a technology, but rather a set of ideas, and enumerated the following basic ideas that constitute SRI:

1. If you transplant, transplant **young seedlings** -- preferably 8-12 days old, but certainly less than 15 days. Direct seeding is an option, however, as we had discussed.
2. Introduce **wider spacing** – not the maximum spacing, but experiment with different spacings to determine the optimum. If you crowd plants together, their roots and canopies cannot grow and spread to best advantage.
3. Keep paddy **soil moist but unflooded**. Both plant roots and soil organisms need oxygen to grow. Ensure that roots and organisms have both sufficient water and enough air. Providing too much of either water or air means that they will not be getting enough of the other.
4. Add as much **organic matter** to the soil as possible. Fertilizer can enhance SRI yields, but the best yields from SRI methods come when the soil has been enriched with organic matter.
5. To the extent possible, **actively aerate the soil** with a rotary hoe. Manual weeding or the use of herbicides can eliminate weeds, but neither stimulates plant roots and soil organisms.

SRI is really quite simple. How young the seedlings should be; how wide to make the spacing; how often irrigation is to be done; how much organic matter gets applied; how often the field is weeded – these are all management decisions that farmers need to make for themselves. What we want farmers to know is that *there are productivity gains to be obtained* from each and all of the changes recommended for SRI, getting away from the conventional practices of using older seedlings, with high plant density, continuous flooding, reliance on chemical fertilizer, and no active soil aeration. I was asked whether farmers can manage their rice crop entirely without any agrochemicals? I said probably not right away, but if they build up the fertility of their soil with SRI practices, this may be possible in the future.

As we drove away from the village, I commented on the farmers' evident interest in new ideas and willingness to innovate. Rajendra said that CDRC's work here is funded in part by Buddha Airlines, with which I had flown from Kathmandu to Biratnagar. Farmers in this community have already gotten together to undertake commercial seed production, utilizing effectively a revolving fund provided by Buddha Airlines. CDRC expects that these farmers' example can have an influence on rural development beyond their village.

After driving north for a while and then east along the East-West Highway, we stopped at Rajendra's parents' home for mid-morning tea and fresh fruit. It was a pleasure to meet his elderly father and mother and an older brother, now retired from service who lives in the home. We discussed with some amusement how both Rajendra and I have become 'infected' by SRI, not a malign infection but a benign one that is spreading.

**Indrapur:** The next place on our itinerary was ward 6 of Indrapur, near Belbari. We first met **Shoba Dhakal**, then her father **Pitamber Dhakal**, and then her brother **Govinda Dhakal**. All were eager to show us their many SRI plots with different varieties and practices, and I learned that Govinda in particular has become an activist for SRI.

When I expressed disappointment upon seeing lodging in some of the plots caused by the recent storm, Shoba insisted there was "no damage" because the grain-filling was already complete. This was made possible because of the earlier maturation of SRI rice. The Dhakals showed me their basmati SRI which was growing tall and upright, while the same rice variety in their neighbor's plot was flattened. Because basmati seedlings are delicate, they transplant 2-3 per hill, rather than the usual 8-9 plants per hill. They had applied no chemical fertilizer to the field, but did apply a urea top-dressing at a rate of 4.5 kg/ha.

Their SRI basmati rice was about a foot taller than the same variety, growing in an adjacent field. They said they get a basmati yield of 3.6 t/ha compared with 2-2.5 t/ha using standard methods. Rajendra said that most farmers in this village migrated to the terai from hill regions, so they have a tradition of using farmyard manure for soil fertilization rather than burning it as fuel. They also grow some sesbania in upland areas which they apply to their fields as green manure.

I discussed the idea that rather than 'feed the plant,' farmers should 'feed the soil ... and let the soil feed the plant.' Govinda understood this and said that he already observed that where organic matter in the soil is higher, there is also less need for weeding. He said that with SRI, "once we know the techniques, no more labor is needed than before," echoing the comments of Krishna K.C. in Hattimudha.

The Dhakals' cropping system is intensive, growing three crops a year: wheat in the winter, then early rice and main-season (monsoon) rice. I asked about the maturity of the crop and was told that they will be harvesting this rice, which normally matures in 155 days, at 123-125 days. This means that SRI methods are accelerating the crop cycle here by as much as a whole month. Another farmer joined us, **Jivanath Dhakal**, a cousin whom we had seen in a neighboring hamlet. "All SRI farmers are Dhakals," Govinda explained with a laugh. He said that their SRI plants have had panicles with as many as 435 grains, with 200 as a minimum; and there have been as many as 62 panicles on a single plant.

When we walked back to the farmstead, we were met by an elderly woman, the president of the farmer association in this village. She had gotten a 12 t/ha SRI yield on her rice field alongside the road, where it was visible to all, giving a boost to Rajendra's efforts here. He informed me that the name of the association is *Himalaya Farmers' Group*. When I said that this seemed a strange name to adopt here in the low-lying terai area, he said that the name reflects their lofty ambitions. It was interesting to learn that a majority of the group's members are women.

Rajendra told me that in the previous year, Govinda's first year with SRI, his spacing had been too wide and the resulting weed problems had reduced his yield. Rajendra and others expected Govinda to give up SRI as a result. But instead, Govinda devised his own weeding implement, reduced the spacing between plants somewhat, and this year was an enthusiastic and successful SRI farmer. He had tripled his area under the new methods to 1.5 hectares. He told me that already there is much demand from other farmers to buy his rice, to use as seed because the grains are so large and uniform. As we walked along the bunds, he waved his arm over the whole area, saying in English, "All SRI, all SRI."

We passed two side-by-side plots planted with the same variety. Govinda said the seedlings for both had come from the same seedbed. The plot planted with 8-day-old seedlings was about a week more mature than the one with 11-day seedlings, so one could see the reported acceleration of growth clearly here. In Indrapur, accelerated maturation of the rice crop is important because in the cropping cycle, vegetables are grown right after rice. If farmers can plant their tomatoes, chillies or other vegetables two, three or four weeks sooner, this has a positive effect on yield. Also, it reduces potential losses due to cold temperature, rain, or pests at the end of the season.

We walked to the home of the farmer group president, who has a large veranda and courtyard, as well as a kiosk for selling sundry small items -- and also a long-distance phone connection. As people sat or stood around, Govinda brought his self-invented weeder, made at a cost of only about 15 rupees (20 US cents). It is made from a thick board, about 8 inches long, mounted perpendicularly on the end of a 6-foot-long handle, like a push-broom. The nails pounded into the bottom of the board stuck out about an inch (see pictures on next page).

Govinda enthusiastically demonstrated how easily and flexibly this simple implement can be used to remove weeds and aerate the soil. He had started with longer nails and a shorter handle, but this led to clogging the 'teeth' with weeds and more back strain. He is very happy with his current design. With this weeder, 10 laborers can weed 1 hectare in a day, he said (4 per acre); with manual weeding, the same task requires 25-30 laborers (10-12 per acre), and this gives less satisfactory results because the soil is not aerated as is done with this simple implement.

Govinda asserted, without any farmer around him contradicting, that "nothing is very difficult with SRI." The main constraints are in people's thinking, he suggested. At this point, someone brought into the courtyard two rice plants to contrast the effects of alternative sets of practices. The root system on the SRI plant was 5-6 times greater, and its height was almost 2 feet more. Possibly the plants had not been selected randomly; but the difference was striking in any case, showing how different practices can induce very different plant phenotypes.



Govinda Dhakal, Indrapur, with self-made weeder in field.



Close-up view of weeder made by Govinda Dhakal, Indrapur, Nepal



I asked how SRI could be spread more effectively, and was told that three years ago, there was in this village only one farmer (not present) who practiced SRI. “Now there are many, many” (although no numbers were suggested). The question was turned to me. What could I do to support the spread of SRI? I explained that I am from a university, not a donor agency, and our function is to provide new and better knowledge which farmers can utilize. We have sought to get funding for SRI spread, but so far, the effort has had to depend mostly on volunteer efforts.

Fortunately, the DADO in this district with Rajendra’s leadership has made Morang the leading area in Nepal for SRI. One farmer said proudly that the farmers in Indrapur are helping to spread SRI, mentioning that a delegation of farmers from Siraha district is planning to visit here in a few days to see their SRI crop. Clearly this is one community where SRI has literally ‘taken root.’ How many more villages like Indrapura there will be, and how soon, remains to be seen.

As we drove along the road from Indrapur, Rajendra recognized a woman sitting in front of her house weaving straw, and we stopped so she could show us the SRI field behind her house. She said there are 22 women in her farming group, and all are now using SRI methods. Some plants in her SRI plot were lodged from the recent storm, but she said that this was no problem because they are already ripe enough for harvest.

Last year, 10 members had used SRI, with the highest yield reaching 9.6 t/ha. Even the lowest, 6.5 t/ha, was much higher than their previous rice yields. Even those who transplanted later than recommended, she said, had reached more than 6 t/ha. These farmers had mechanical weeders, and the woman showing us around said that with these, one person can weed as much as 10 persons manually, although for best results, two persons work together, one pushing the weeder and another following behind to pull up any weeds that get missed on the edges of the swath. Labor for weeding, she said, was reduced by three-fourths and is “easier once learned.”

The women in the association now want to learn about vermicomposting and biocomposting. They are spending about Rs. 100,000 on chemical fertilizer and would like to replace this with biocompost. As we were about to leave, another farmer in the community came to meet us. He had planted early-season SRI this year, with a yield of 8.2 t/ha. [Note: in this report, most yields given by farmers in maunds (40 kg) per kattha (30 kattha = 1 ha) have been converted into tons per hectare for simplicity’s sake.]

**Kaseni:** Driving farther in a large circle heading back toward Biratnagar, we came to the Kaseni VDC area. This has been an area of considerable Maoist activity in recent years. However, it is peaceful now that a ceasefire has gone into effect. We drove uneventfully past a Maoist military camp right located along the highway, self-identified by big signs and red flags. This was until recently a government facility, now occupied by the guerillas. Rajendra explained that he had been able to carry on with SRI popularization during the past two years despite the intermittent violence. Farmers had communicated to the Maoist forces operating in the area that SRI work is ‘pro-poor’ and in the people’s interest. So while other government activities had been shut down during the height of conflict, SRI extension had continued. [[http://www.regional.org.au/au/apen/2006/refereed/1/3058\\_upretyr.htm](http://www.regional.org.au/au/apen/2006/refereed/1/3058_upretyr.htm)]

After driving along the Sunsari-Morang main canal for some distance, we turned off and came to the home of **Kalyan Rai**, who was one of the first SRI farmers in the district and currently has the largest SRI field, 2 hectares of land under the new methods. Two years ago, I received by email from Rajendra a picture of Kalyan holding up a rotary-hoe weeder that he made for himself to be able to practice SRI. There was a very large fishpond next to Kalyan's house, and the expansive grassy lawn surrounding the farmhouse was the first that I had seen in rural Nepal.

Kalyan welcomed us and took us through the SRI fields behind his house. He still uses some fertilizer (60 kg of urea/ha) but is seeking to cut this. He showed us two leguminous species, rostrata and sesbania, interplanted in his rice plots. When asked, he guessed that they will enhance his yield by 20-25%. Over time, his yields have gone up from 160 maunds the first year, to 175 maunds in 2005, and this year he expects a yield of >200 maunds (8 t/ha). Before he produced only 3 t/ha, and that required more expenditure on chemical fertilizer. He transplants seedlings at 12 days and is harvesting his crop about 25 days earlier than usually expected.

Back at his house, Kalyan showed us the weeders that he has been using. In addition to the rotary-hoe that he first designed and built, something similar to what farmers in Sri Lanka call a 'Japanese weeder' (or what Chinese farmers call a 'wolf-fang weeder'), Kalyan has designed an compact but slightly bulky weeder with flat teeth about an inch long, mounted on a metal axle. This axle is mounted on a long handle for pushing the implement through the field. The weeder is somewhat similar in concept to Govinda's, but more solid and heavier. Kalyan said he is not yet satisfied with his design and will keep working on it.

We climbed the steps to the second-story verandah of Kalyan's house to drink some refreshing tea, looking out over the fish pond. Kalyan said he learned about SRI from visiting his wife's village, Sundarpur, where a farmer named Udayanarayan Nepal had just started practicing SRI. He was impressed by the field, came home and made a weeder, and also contacted Rajendra for advice. Since then he has taught many other farmers how to practice SRI.

He is only doing one weeding at present, so I suggested that he experiment with doing 2 or 3 weedings on parts of his field to see whether more soil aeration can further enhance his yield. (He has been doing a minimum of weeding so far, just enough to control the weeds.) After thanking him and his wife for the tea, we returned to the Sunsari-Morang main canal and drove along it back toward Biratnagar. Because we had been making a big circle, we were now only a few kilometers from the city.

### **Revisiting the Nepal Times Story**

Our next village visit was to the place where the Kathmandu-based journalist Kunda Dixit had done interviews for a story on SRI in Nepal, published in the July 15-21 issue of the Nepal Times last year [<http://www.nepalitimes.com/issue/256/Nation/569>]. This story attracted attention to SRI nationally and even internationally, as it led to Charles Haviland of the BBC World Service doing a special report on SRI in Morang district for BBC's *Asia Today* television series in September, 2005 [[http://news.bbc.co.uk/2/hi/south\\_asia/4200688.stm](http://news.bbc.co.uk/2/hi/south_asia/4200688.stm)].

En route we passed through the village of Jhorahat, home of **Kishore Luitel**, the young farmer whom the Nepal Times article described as becoming thoroughly convinced of SRI's merits after

trying it out for himself. Having been recruited and trained by Rajendra to serve as an SRI trainer, he was the person who had trained **Dan Bahadur Rajbansi**, the farmer featured in the article. According to Rajendra, Kishore together with Rudra, whom I had met at the first stop that morning, have trained hundreds of farmers in SRI methods.

Just before we reached Baijanathpur, 3 km east of Biratnagar, we stopped to look at a biocomposting unit in a farmhouse yard. This was a rectangular container made with corrugated tin roofing material, 1.5 by 2 meters, into which the farmer put alternating layers of farmyard manure (about 60%) and green manure (about 40%). The mixture was periodically aerated, and certain microorganisms were added to accelerate decomposition. In three months, this unit can produce 2 metric tons of biocompost, enough for 6 hectares of land. The output is initially used to reduce the need for chemical fertilizer. But over time as soil fertility is enhanced, it should become possible to rely entirely on this source of soil fertilization, requiring little cash expenditure. The cost savings more than compensate for the labor needed, Rajendra said.

When we reached the field where the *Nepal Times* story had been based, Dan Bahadur was there to meet us, wearing a University of North Carolina baseball cap, long with his brother, **Udaya Rajbansi**, and other neighbors. Kishore Luintel joined us within a few minutes. Dan Bahadur and his brother were the only two farmers in the area who planted a spring crop of rice in this drought year, 2 hectares of SRI. This was possible because they had access to groundwater from a pump and SRI required less water than growing ‘regular’ rice.

When I asked about grain weight, Rajendra said that most measurements have shown SRI paddy weighing about 2 grams more per 1,000 grains. This is a bonus of about 5-10%. I asked whether anyone has assessed any differences in the outturn of milled rice from SRI paddy. Finished rice is valued by weight (in kg), whereas paddy is purchased by traders or millers by volume (by bag or by bushel). Rajendra said that nobody has looked into this difference if any. I suggested they should pay attention to this conversion because in other countries we find that when SRI paddy is milled, it produces about 15% more milled rice – because there are fewer unfilled grains in the paddy (less chaff) and there is less shattering during the milling process (fewer broken grains).

In Sri Lanka, millers in the Mahaweli System H area began competing for SRI paddy as early as 2002, offering even before harvest to pay SRI farmers 10% more per bushel for their paddy rice. This premium still left millers with more profit. I have suggested in India that the simplest and cheapest way to promote SRI would be to require millers to pay 10% more for SRI paddy, so that this 15% windfall does not all go into their pockets. Farmers who employ laborers to grow SRI should in turn share this bonus with their laborers. This may be hard to institutionalize, but it is worth suggesting as a matter of equity as well as for the incentive effect.

These farmers’ main-season crop this year will be harvested at 120 days, a 25-day acceleration of maturity. In this area, the soil is heavier clay, and thus it is harder here to use a rotary hoe, which gets easily clogged. Dan Bahadur’s crop had only two mechanical weedings plus one hand weeding. The farmers in this area are mostly Tharus and Rajbansis, who generally burn their straw rather than incorporate it back into the soil. Also, they use more cattle dung as fuel.

Building up soil organic matter is thus a challenge in this area. Dan Bahadur's brother said that they already seen SRI having a good effect on the soil. This is their fourth year using SRI, he said, and the soil is "looser, easier to plough." I explained how returning organic matter into the soil has this effect. SRI plants with their larger canopies and root systems put more organic compounds into the soil as exudates. These support larger populations of soil organisms, which in turn improve soil aggregation, so that the soil is better structured and aerated, thus easier for plant roots to penetrate. Udaya said that before, when they used only chemical fertilizer, they turned up big clumps when they plowed. "Now there are no more clumps."

The big constraint here is the cost of pumping water, which creates an incentive for SRI use. The brothers are trying to organize farmers to pay deposits so that electricity can be brought into the area. Electrical power, once available, is subsidized by the government. The cost of pumping water with diesel is 5-10 times higher. Udaya also had some SRI plots planted with a basmati variety that was growing well. To establish this crop, he transplanted 3-4 seedlings per hill, instead of the usual 8-9 seedlings. Basmati plants are more delicate than other varieties and are liable to setbacks if planted singly.

In one plot, we saw a hybrid variety being grown with SRI methods, and it too was doing well. With good management, the farmers expected a yield of over 10 t/ha with the hybrid. They estimated that hybrid seeds can give 40-50% more yield, so that their seed cost (many times greater than for regular seed) can be justified. SRI is especially helpful when planting hybrid rice because it reduces the amount of seed needed by 80-90%.

This group of farmers was rather different from most of those whom we had visited during the day, perhaps because they live and cultivate closer to a large city, Biratnagar. They wore more modern clothing and were more involved in calculating rates of return and thinking through capital investments. One advantage of SRI is that it can benefit a wide spectrum of farmers.

### **Periurban SRI**

When we got back to Biratnagar about 4, we had a late lunch in town and then proceeded through the city to its southern edge, only 2 km from the Indian border. There, next to a temple, was the SRI field of **Babu Nandan Yadav**, who in addition to being a rice farmer is head of the local branch of the Sad Bhavana (Anandi) party.

Babu came to meet us as we walked around his plots. About six weeks earlier, John Duxbury and Julie Lauren from Cornell had also visited his field. He told us that the demand for his rice is very high -- to be used as seed. There is a market around the temple once a week, so hundreds of people have seen and admired his crop this season.

In one corner of the field planted with Radha-12 variety, we noticed that the rice had lodged. Babu said, as others had told us, that this will not be a serious problem since the rice is mature (thanks to its accelerated maturity). He asked me why I thought this lodging occurred. I pointed out that this corner was the low-lying part of the field, which I suspected was not well-drained. He confirmed this. All the rice on his basmati plot was upright and in prime condition.

Babu said that he had recently met the Prime Minister of Nepal and had invited him to visit this SRI field. Due to a health condition, the PM was not able to come, but Babu said he had impressed upon the Prime Minister how satisfied he is with SRI methods. He added that the Trade and Supply Minister was able to visit the field and see the rice crop for himself.

In this part of Nepal, rice is a ubiquitous crop, grown twice a year on the same land wherever water supply permits. The large increases in yield that SRI is permitting should mean that rice can become abundant, with basic food needs being easily met. However, with this change one can expect the price for rice to decline. Incomes from rice production can remain reasonable because farmers' costs of production are reduced. However, the longer-run effect should be to enable Nepal to devote less of its land, labor, water and capital to meeting basic food needs. This will permit farmers to redeploy to more productive uses the resources no longer needed for rice, further enhancing people's incomes and nutrition in the process.

Also, SRI concepts and practices may be able to raise the productivity of resources used for other crops, as we are seeing in India where yields of sugar cane and ragi (finger millet) as much as three times higher are being achieved, without relying on chemical fertilizer. One can hope that SRI will have a broad impact on the agricultural sector, extending beyond rice.

### **Regional SRI Forum**

The next morning, Saturday, I was brought to the Regional Agricultural Development Office in Biratnagar at 10 o'clock for an experience-sharing session that Rajendra had organized to take advantage of my visit. Because some participants were coming from long distances, even several districts away, the group assembled slowly, but the forum was able to start before 11.

After a short welcome, Rajendra invited self-introductions. First was **B. D. Dahal** from the NGO **Multipurpose Development Management Services** (MDMS), who was assisting me as my translator. We had been in email correspondence several years ago when he and MDMS were working with the Sunsari-Morang Irrigation Project, funded by DFID. The leader of the NEDECO technical assistance team, Bob Davey, had gotten one of my papers on SRI, and after long discussions had decided to try out the methods. Staff of the Agriculture Department had been quite negative, saying that SRI had already been tried out at Kumaltar and Bhairahawa and was not found to be worthwhile (as noted in the background above). However, when the team evaluated SRI systematically through farmer field schools, they had found otherwise. My self-introduction came next, and then a long succession of introductions.

- ❑ **Prem Prakash Uprety**, Rajendra's brother, said that he is the Local Development Officer for Morang district. This is an important position complementing the agricultural development work of Rajendra, and Prem is in a position to assist in the spread of SRI. He said he had come to the meeting to learn more about SRI.
- ❑ **Pustak Raj Ojha**, manager for DFID's **Community Support Programme**, said that he had gotten interested in SRI from reading Kunda Dixit's article in the *Nepal Times* and had then checked out the CIIFAD website on SRI.
- ❑ **P. B. Rajracharya**, a former regional agricultural training chief in Janakpur, now retired and operating private extension service centers, said he got SRI training materials from Rajendra, adding something about "double, triple area" that I did not understand.

- **Buddhi Pokharel** from **CARE** said that his NGO is now working with SRI in the eastern region, and he wants to know more about it.
- **Naveen Kumar Karki** from the NGO **Rural Reconstruction Nepal (RRN)** introduced himself, saying that RRN has been working in several terai districts since 2000 on integrated pest management (IPM). It works through farmer field schools and introduces organic farming in general. He wanted to know more about how SRI could fit into his program.
- **Raj Kant Jha**, a crop protection specialist who worked formerly with the Sunsari-Morang Irrigation Project (with Dahal and others), is now in the DADO for Dhankuta district, where he has been initiating SRI. He also had been in previous email communication with me about SRI, although we had not met personally before this morning.
- Next, **Dipak Dhungana**, a young farmer from Manglung sporting a jaunty baseball cap, and **Dilliram Sigdel**, an older farmer from Piple wearing a *topi*, the traditional Nepali cap, introduced themselves. Rajendra whispered to me that they are both farmer-trainers whose work is being supported from the grant that CIIFAD provided from Triad Foundation funds.
- **Bhuban Singh Buddhattoki** from the DADO Terathun said that he works with Dipak and Dilliram.
- **Lokendra Karki** from CDRC I had met the day before during the visit to Hattimudha VDC.
- **Padan Thagunna** from the NGO **LI-BIRD** had given me, before the forum, a summary of his SRI experience in Sunsari district. He explained that this work was not supported by his NGO but was more a matter of personal interest, stimulated by Rajendra. The report he gave me presented detailed data for the 15 farmers who used SRI methods in 2005. I calculated that their average yield was 5.72 t/ha.
- **Krishna Prasad Timsina** from the NGO **SEBAC Nepal** introduced himself, and then
- **Harinarayan Chaudhury**, MDMS senior farmer-trainer, whom Dahal had introduced me to before the forum started, did the same.
- **Madhu Sudhan Pokhrel**, a retired civil service (meteorologist), introduced himself, saying that he is experimenting with various SRI methods including direct seeding.
- **Ghanashyam Singh**, a former Regional Director of Agriculture now retired from government service and involved in NGO work, said that he had been regional agriculture director when the Sunsari-Morang Irrigation Project was operating, and he had seen the very first SRI trials. He said that two hindrances for SRI adoption are weeding requirements and the use of young seedlings. With mechanical weeders, the first problem can be handled, and by raising seedlings properly, in soil that is not heavy clay, the second can also be eased. However, he said that he has seen research showing that farmers can use seedlings up to 21 days old without any disadvantage. I withheld comment until it was my time to speak again.
- **Kashi Kumar Choudhury**, a senior technician from DADO Morang, introduced himself.
- **Shoba Dhakal**, whom I met the day before at Indrapur, introduced herself, as did another woman farmer sitting beside her, **Uma Rai**.
- **Govinda Dhakal**, Shoba's brother, was next. He spoke at length later.
- **Shiva Gautam**, a farmer from Illam district, introduced himself.
- **Ramesh Kumar Chaudhury**, a Morang district farmer, said that he had gotten 8.5 maunds per kattha, over 10 tons per hectare.
- **Krishna K.C.** whom I had met at Hattimudha VDC on Friday introduced himself, together with another farmer from there named **Surendra**.
- **Bogendra Raj** said that he had expanded his SRI area from 2 katthas to 7 katthas this year.

- **Kishore Luitel**, the SRI farmer-trainer whose efforts were reported in the *Nepal Times* article said simply that he has been practicing SRI for three years.
- **Manoj Khadka** was a staff member for the Community Support Programme, supported by DFID in Dhankuta, and **Jit Rai** also introduced himself as an employee of CSP in Dhankuta.
- **Hem Chandra Adhikari** spoke as a farmer from Dhankuta, and **Ram Chandra** said that he is a farmer from Pakribas in the same district.
- **Kalyan Rai** introduced himself very simply, not saying that he was one of the first SRI farmers in Morang district.
- **Gita Phoyal**, a woman SRI farmer, introduced herself without comment.
- **Biresh Rai** offered some advice: to control weeds under SRI, farmers should flood their field for 15-20 days before transplanting, and then drain it enough to leave the soil just muddy. This saturation of the soil will eliminate most weeds.
- **Sagar Bhattarai** from DADO Morang, who traveled with us on Friday, introduced himself, and then several farmers whose names I did not get written down, and then **Rudra**, the Junior Technician and SRI farmer whom I visited first to start our Friday field visit.
- Finally, four local DADO staff introduced themselves: **Tek Bahadur Pokhrel**, **Ram Prasad Sivakoti**, **Bishnu Mani Pokhrel**, and **Bhavani Bhattarai**.

During the introductions, a farmer from Saptari district brought a huge SRI plant, over 5 feet tall, into the auditorium, unwrapping it and placing it in the center at the front of the big hall. The canopy measured almost 3 feet across, and a large root ball steadied it. This stood as an impressive emblem throughout the forum that followed.

**Buddhi Pokhrel** from CARE gave a formal welcome to everyone on behalf of the participants, and then Rajendra set the stage for the forum. I could hear English phrases such as “farmers are the main source of information” and “SRI is dynamic” punctuating his Nepali. He said that in Morang, they started with SRI “as we encountered it in the literature, but we have learned many things from practice,” such as the best use of weeders. “Such experience should be exchanged.”

**Govind Buddathoki** from Therathun district was invited to speak first. He apologized saying, “I am new to SRI,” but he added that he is already “very confident about its methods.” Twelve farmers in his community practiced SRI this year, using a local variety and planting 12 ropanis of land (6000 square meters, or 0.6 hectares). The rice plants had 60 tillers or more, with yield less in the hills than in the plains. Their biggest problem was weed control, given that it has been difficult to use mechanical weeders on small plots. (The reason for this was not clear since the weeders themselves are quite small.) He estimated that they are getting doubled yield with SRI despite their difficulties. “This is our first time, and I am interested to learn still more.”

**Siva Gautam** from Illam said that he had had no training on SRI, meaning no formal schooling. Instead he had about it learned from DADO Illam, a form of non-formal education. One thing that pleased him most about SRI was its reduced seed rate. He could get a good crop from just half a kilogram of seed where before it was necessary to use 4 kg.

With SRI, he had found that the labor required for uprooting seedlings and for transplanting them was reduced; one person could do what it formerly took four persons to do. (This may be an exaggeration). The main problem they had encountered was weeding. “When less water is

applied to the field, the weeds are more.” Siva said that the suggestion offered to flood the field for 15-20 days before transplanting to control weeds is a good one. “But it won’t help farmers where water is scarce.” He said he had done three weedings of his field, and this was sufficient.

**Ram Chandra Sapkota** from Dhankuta district, very tall and wearing a *topi*, gave a long report. He said that he is from a very remote area and heard about SRI methods for the first time this year. He expressed appreciation to me for coming to meet with them here in Nepal. Farmers in his community learned about SRI from Mr. Jha, DADO Dhankuta, who came to tell them about it. His farmer group has 25 members, and there are three such groups in his village. They have an SRI demonstration plot, and all members come at least once a week. They had also learned about seedbed solarization (which will make my Cornell colleague John Duxbury happy).

“Before we were not aware of the harm that we do to the seedlings when we flood the seedbed. Also, we didn’t believe that we could use 10-day-old seedlings. Everybody was afraid to handle them,” he said. After discussing this with Jha, they told him, “It is not possible.” However, they did the transplanting as instructed despite their doubts. When Ram’s father first visited their transplanted SRI plot, he declared mockingly, “This land is fallow.” Even when the technician tried to convince him about SRI, the old man remained unpersuaded.

Twenty days after transplanting, however, they could already observe 15-20 tillers on single SRI plants. “Gradually we became more and more encouraged.” The photos that they had seen -- showing how SRI plants, once they start tillering, fill out rapidly -- had given them courage and made them think: “How can we get this kind of plants for ourselves?”

Now we are about to harvest, Ram said. Our plants have 70-80 tillers, and up to 40 fertile tillers. “We did some experiments of our own, with 1, 2, 3, 4 and 5 plants per hill, and now we are quite satisfied that single seedlings are best.” I asked him what were the results of their comparison trials? Ram said they got as many as 65 tillers from single plants, whereas the hills with 5 plants gave only 7-10 tillers.

There are 80 households in his village, Ram added, and it is a remote area. “We have no food self-sufficiency. All households have to send some of their members outside to earn income as laborers.” Households can produce only enough rice for 4-5 months of their annual consumption. “This method [SRI] is quite suitable for poor and marginal farmers,” he said, using the language of NGOs and development agencies, adding “Land productivity is really crucial.”

“My grandfather had 50 ropanis of land” (2.5 hectares). “Now in my generation, because of all the subdivision of his holdings, I have only 3 ropanis [0.15 hectares]. We have to get higher yields. This season,” he said, “we are expecting more self-sufficiency in food, thanks to SRI. Farmers who have not participated in this program are now visiting our fields.” He concluded with the statement that the government and NGOs should focus their programs on eliminating poverty, then adding, “My father is happy now.”

**Kalyan Rai** from Kaseni was the first of the Morang district farmers invited to speak. He echoed the others’ comments that weed management is important, and added that land needs to be very level or there will be difficulties in water distribution. Earlier he got 40-45 maunds per bigha,



about 5 tons per hectare. Three years ago he saw a poster about SRI mentioning that three times this amount could be produced, and that got him interested.

Over the past three years, he has followed SRI methods with DADO supervision. When the field was not kept flooded, he encountered weed growth. From his talks with other farmers about this he decided that he needed to use a mechanical weeder. He manufactured one of his own from metal, and then he improved the design with subsequent experience. He can now easily weed 5-6 katthas a day with his own implement, he said (weeding one hectare would take 5-6 person-days). Kalyan is beginning to use biofertilizers and is seeing good results from this. He said he was encouraged by my having told him that planting younger seedlings can increase his yield even more. Particularly he was glad to learn that SRI concepts can be used for other crops like finger millet. He wants to try this himself.

**Govinda Dhakal** from Indrapur prefaced his remarks by observing that paddy is their most important food crop. He has been using SRI now for three years and said that farmers should be serious about learning new ideas from technicians. He repeated what I had said during my visit to his village the day before: feed the soil, and the soil will feed the plant. He liked that concept. In his village where they cultivate vegetables, the value of organic matter in the soil is now well understood. Plant residues are composted, as well as cattle manure and urine, and grass cuttings from around the homestead. From just 1 kattha (0.03 ha) of land, he was able to earn 20,000 rupees (\$285) growing leafy vegetables last year. He has been able to make his soil very fertile, so he knows that time and effort invested to make and apply compost can pay off well. He also knows now the benefits of planting single seedlings or seeds, so there is just one plant per hill.

He said that the seed multiplication with SRI is very good. He has been able to get as many as 21,000 grains of rice from a single grain (i.e., seedling). But this only is possible with fertile soil. He discussed his experience with controlling weeds, which initially almost discouraged him from continuing with SRI. He found that one of the first weeders he constructed had problems because the roots of the previous crop got tangled in it. So he made adjustments in design and in timing of his operations. Now he uses a very simple weeder that cost him only 15 rupees to make. It saves him a lot of labor time compared with traditional hand-weeding methods. He concluded by reiterating the five points that I had made in his village yesterday (and at Hattimudha) about the five basic ideas of SRI, and how they are more important than the specific practices.

**Shree Narayan Dhami** from Motipur started by saying: “Other people say that it is difficult to adopt SRI, but I say that it is not so difficult, and SRI offers many advantages.” The seed rate is low; there is less insect attack. He said that in his SRI field, the number of tillers per plant has reached even 105, with as many as 70 of them productive. His father and others did not accept the new method at first (sounding like Ram Chandra). But now they see its advantages.

He starts weeding at 15 days after transplanting. In his group there are now 33 members who follow SRI, and its performance is good at all locations. He likes to use the mechanical weeder, but it is important that transplanting be done very carefully in rows if this is to be effective. If the spacing between plants is less than 25 cm, then weeding becomes difficult.

**Kishore Luitel** from Jhorahat said that he is “very much happy” about SRI, having learned it from Rajendra three years ago. At first, he was only able to cultivate 1.5 katthas with SRI because he could not convince the other members of his family about the merits of SRI. He had to invite DADO staff to come talk with them so that they would let him proceed, and “still they were not really convinced.” When people saw his transplanted SRI field, “So many said that I had become mad.” His family retained a big supply of seedlings in the nursery with which to replant the SRI plot if it did not grow as expected. However, by 21 days they all saw that single SRI plants had as many tillers as 8 plants in their own hills. “So they became satisfied and destroyed the remaining seedlings in the nursery.”

His father, who used too much chemical fertilizer, produced only 3 maunds per kattha (3.6 t/ha) while his own production was more than double this much. After harvesting his SRI rice, Kishore asked his father which method they should use next season, and his father said, “It is up to you.” They planted 6 katthas the next season, and this year, all of the family’s 10 katthas of paddy land are under SRI. Friends who had been teasing him initially, once they saw the performance of SRI plants, often visited his field when he wasn’t there just to look at it.

This year, he has been experimenting with various alternative practices: solarization vs. non-solarization of the seedbed; 20 cm vs. 30 cm spacing; 10-day vs. 21-day seedlings; chemical fertilizer vs. compost; vermicompost vs. fertilizer; and vermicompost plus fertilizer vs. just fertilizer alone. From just 6 katthas of land, he is now producing as much rice as from 15 katthas before. “SRI is very much useful to alleviate poverty,” he said in conclusion, “the costs of production are less, and the pest and disease problems are less.” He proposed that an organization be created to carry out a national campaign for SRI.

When **Krishna K.C.** from Hatimuda began speaking next, confident and clear like those before him, I reflected on how impressive were the farmers speaking at this forum. This confirmed the idea that farmer participation is really one of the core practices of SRI, rather than just as a method for its dissemination. The success of SRI comes not only from the different ways of managing plants, soil, water and nutrients, but also from the way that farmers are approached and involved in SRI, eliciting and reinforcing a sense of responsibility and a spirit of innovation.

In his community, Krishna said, they started SRI three years ago after contact with Rajendra. They started using 10-day seedlings, but at first they transplanted too deeply, so this reduced tillering. Now they avoid this mistake. CDRC helped them with group formation, and now in their two communities, there are 14 groups with 400 farmer-members.

Some farmers in his area still use 2 seedlings per hill and transplant at 21 days, not earlier. There is lingering apprehension about water supply since their supply from the Sunsari-Morang irrigation system is not fully assured. They have had some problems with neck blast, which causes all the spikelets to be sterile. However even so, farmers in his area have usually gotten at least 4.5 maunds per kattha (5.4 t/ha). This year he used 10-day-old seedlings and started his weeding 7 days after transplanting -- “to stay ahead of the weeds.”

From his experience, the three things that he would emphasize for successful SRI are: (1) there should be assured irrigation facilities, (2) there should be good quality seed available, and (3)

there should be good fertile soil. “SRI methods are better, and they should be adopted, provided these three conditions can be met.” (I guessed that, if asked, he would probably added as a fourth condition: there should be availability of weeders.)

Before the next farmer spoke, Rajendra commented that this year there had been a severe drought west of the Koshi River. However, the large rice plant in front of us had come from the western part of Saptari district where SRI farmers were able to get a good result there if they got their rice crop established early. “Most other rice farmers have little to show for their efforts.”

With this preface, **Sabur Lal Chaudhury** from Saptari reported on his SRI experience. He was proud that the plant in front of us was from his district. He said that after he received training on SRI from Rajendra, he was the only person in his village willing to use the new methods. “Now others are regretting that they did not follow my example.” He described his seed preparation and crop establishment techniques, adding that he had done 3 weedings.

This was perhaps more than other farmers in the district and helps explain the vigorous growth of the rice plant on display in front of us, since it would have benefited from frequent soil aeration. Also, he had top-dressed the plants with urea at 50 days after transplanting, which would have helped. His resulting plants had 75 to 110 tillers. Farmers had even come from other districts to observe his crop, he said. It has now been harvested but has not yet been threshed, so he could not tell us the yield. He guessed it would be about 8 maunds per kattha (9.6 t/ha). Last year, his crop gave him only 3 maunds per kattha.

Next, **Madhu Sudhan Pokrel**, the retired meteorologist turned SRI farmer-experimenter, spoke, longer than most. He was doing some interesting experiments with young seedlings, e.g., with ones as young as 5 days in pot trials to see the effects of different compost preparations and also supplementary inorganic fertilization. He has gotten as many as 60 productive tillers from one plant (although pot experiments are usually unrepresentative of field soil conditions because of differences in soil organisms). He has tried spreading soil and compost on polyurethane sheets and then doing dry seeding, with wide spacing, to establish a crop, insisting that “we can reach 90% effective tillering if the management is good.”

When he was asked about his costs of production, farmers’ reaction was that this level of expenditure was too high. Such investigations may produce some improvements upon the basic SRI strategy, but it did not appear that Madhu had yet made any advances that farmers would adopt. (Afterwards, Madhu confided to Rajendra that he has been working in isolation and had thought that he was more knowledgeable about SRI than he really is. He said that he learned a lot from the day’s discussions and will continue his efforts.)

**Raj Kant Jha** from DADO Dhankuta who had helped Ram Chandra Sapkota and his fellow villagers get started with SRI there gave a brief report from his district. He is introducing SRI through farmer field schools, which he had worked with previously while attached to DFID’s Sunsari-Morang Irrigation Project. He is including seedbed solarization with SRI methods. Already 250 farmers are using SRI methods in Dhankuta, and the response has been very good.

**Naveen Kumar Karki** from RRN said that his NGO had been introducing IPM through farmer field schools in several terai districts since 2000. He came to the forum to learn more about SRI. He could see that it should be very suitable for the farmers with whom RRN is working, so they will plan to add SRI to their program in the coming year.

**Padan Thagunna** from LI-BIRD said that his NGO has been working in Sunsari district for the last six years in three selected areas. Above, I noted the yield results from the 15 farmers with whom Padan has been working. In his report, he summarized their learning thus far as follows:

**Potentiality of SRI:**

- ❑ Increasing the production of rice up to double of existing production.
- ❑ Decreasing seed rate of rice up to 87.5%.
- ❑ Shortening of the cropping period of rice up to 25 days, which is suitable for rice-vegetable system.
- ❑ Contribution to crop improvement due to single seedling transplantation.
- ❑ Reducing labour requirement.
- ❑ Reducing water requirement; suitable for uplands.
- ❑ Health plants with maximum tillers, resulting resistance to lodging, insects and diseases.

**Problems:**

- ❑ Heavy emergence of weeds.
- ❑ Requires controlled irrigation system.
- ❑ Single young seedling transplantation in line within 30 minutes of uprooting.

**Solutions:**

- ❑ Mechanization in rice cultivation (involvement of engineering with agriculture background)
  1. Development and use of tractor-mounted equipments.
  2. Controlled irrigation system (groundwater lifted with electrical pumps).
  3. Development and use of tractor-mounted rice transplanters, cultivators, harvesters.
  4. Wider scale extension of the technology in farmers' fields and training.
- ❑ Influencing Government effectively for subsidy on equipments and mechanization in agriculture.
- ❑ Supportive government policy in technical aspects (DADOs should focus on such activity).

**Conclusion:**

Agricultural development will never be successful in reality if mechanization is ignored. We need engineers in agriculture who are capable of developing appropriate machines for our farmers and government must make policy so that farmers can afford these machines. If we always think of technical papers and seminars to present them we will never be successful. So in conclusion, it is sure that SRI can increase production in rice, but the question is, can we mechanize our agriculture?

In his oral comments, Padan emphasized that SRI will be very helpful for maintaining seed purity for seed producer. He commented that “Generally people say that SRI requires more labor, but actually, less labor is required if done well.” He said that water requirement is also less, but there needs to be an assured water supply. The main problem to be solved is that of weed control. As in his paper, he also emphasized the need for developing suitable implements and making them available, also suggesting that a mechanical seedling transplanter be developed.

**Lokendra Karki** from CDRC reported on how they started in Hattimudha in 2005 with three farmers in two VDC areas, planting a total area of 1 hectare under SRI. The yields were 7.2 and 7.3 t/ha with Radha-12 variety, and 4.8 t/ha with another variety. 150 farmers observed the demonstrations. This year, 18 farmers tried SRI plus solarization, although because of the drought conditions and lack of water, this number had dropped to 8.

His main concern now is how to scale up SRI, and he cited an example of how the International Fertilizer Development Corporation (IFDC) had introduced some nutrient management practices such as banding fertilizer applications, with much effort and cost. However, many or most farmers gave up the practice once the assistance ended. He wants to be sure that this does not happen with SRI, a concern that Padan from LI-BIRD had also expressed. (A note: We have not proposed subsidies as a strategy to promote SRI adoption, knowing that SRI can give enough productivity advantage that subsidies should not be needed. Possibly a first-year guarantee that any drop in production will be reimbursed is justifiable, as this is almost never claimed.)

**Hari Narayan Chaudhury** from MDMS had a handout of powerpoint slides that summarized the experience with SRI under the DFID-funded Sunsari-Morang Irrigation Project (discussed in the introduction of this trip report, with a summary table). Hari Narayan lamented that there had been no follow-up after the project ended. (MDMS made efforts to find some donor support to continue its NGO activity with farmers in the area, but no support had been forthcoming for SRI; it fell to DADO Morang office to carry the work forward, which Rajendra and other DADO staff have done very effectively.) Hari Narayan concluded with the exhortation that “Nepal can be converted into a Japan if we work hard, because we have abundant land and water resources.”

**Buddhi Pokharel** from CARE said his NGO is working in the Churia and Siwalik hill regions in Sarlahi and Mohottari districts. They are doing seedbed solarization as introduced by Cornell University (John Duxbury and Julie Lauren). They started with vegetable seedbed solarization in 2003 through farmer field schools, and now have 400 cooperating farmers involved in their own farmer associations. SRI has been added to the program, but unfortunately the water supply from the two available irrigation facilities is not assured. They are working with actual farmers, not just with landowners, he noted.

So far, three rice varieties have been tried out with SRI methods, using 30 cm spacing, and 3-5 manual weedings (they do not have weeders yet). Buddhi referred to applying “the recommended dose of fertilizer,” but did not say what this was. Farmers are getting 65 tillers per plant (hill), 40-45 of them fertile, and their yields are up to 7 tons per hectare, “even though this area is not thought to be very good for rice.”

The problems encountered have been, first, that it is hard to get farmers to transplant as far apart as 30 cm, and they find it hard to handle the tender young seedlings. (This is a skill that comes with practice.) Second, there is need to have assured irrigation, a comment heard repeatedly. His conclusion was that “SRI is suitable for small landholders.” He endorsed farmer field schools as the best approach for disseminating SRI, and said that they need to train all their IPM trainers in SRI methods as well as to integrate SRI with other agricultural activities.

As the forum was drawing to a close, P. B. Bajracharya approached me, handing me a small notebook sheet full of numbers, and said apologetically that he had to leave before the end. He did not have time to discuss this, he added, but hoped that I would study it carefully. The paper did not explain when or from where the data had been derived, but they were carefully worked out. This is what he gave me:

To: Dr. Norman  
 From: P. B. Bajracharya, Senior Ag. Expert (Jt. Sec.)

Comparative Economic Analysis between SRI and Conventional Method (Rs./ha.)

Cost Description	Technology	
	Conventional	SRI
Seed	Rs. 900.00	Rs. 105.00
Fertiliser	Rs. 2,560.00	Rs. 640.00
Compost	Rs. 500.00	Rs. 6,250.00
Pesticide use	Rs. 320.00	Rs. 14.00
Labour days	200 days	320 days
Labour cost	Rs. 16,000.00	Rs. 25,600.00
Other costs	Rs. 2,500.00	Rs. 3,000.00
[Total costs]	[Rs. 22,780.00]	[Rs. 35,609.00]
Income		
Paddy	Rs. 40,590.00	Rs. 104,720.00
Straw	Rs. 9,000.00	Rs. 18,000.00
Total income	Rs. 49,590.00	Rs. 122,720.00
Benefit	Rs. 28,810.00	Rs. 87,111.00
Cost of 1 kg rice production	Rs. 3.45	Rs. 1.85

At the bottom was written:

- Scale-up mechanism lacking
- Lack of Govt policy to promote SRI
- NARC vs. SRI

The last point implied that the National Agricultural Research Council is opposing SRI, an attitude that I think has changed. I visited NARC headquarters the following week in Kathmandu.

The labor inputs which he showed were much higher with SRI production (60%). This was surprising since farmers had been repeatedly reporting that SRI practices need not raise labor

requirements, and in fact, often reduce their labor. Perhaps Bajracharya's data came from first-year use of the methods, or maybe particularly careful and intensive management was done. In any case, despite the higher labor costs, SRI gave enough additional output that the total cost of producing a kilogram of rice was reduced by 45%, which greatly adds to SRI's profitability.

I later calculated the economic return from the additional input of labor invested, even if it seemed excessive. Despite a 60% increase in labor inputs, net income per hectare was increased by Rs. 58,301.00 in return for the 120 days of additional labor. For each additional day of labor invested, there was a return of Rs. 485 (\$7). This represents a *profit per day* from additional labor that is *six times more* than the Rs. 80 per day paid for agricultural labor. This is a very high rate of return on marginal investment. However, as noted many times in this report, with SRI, labor is decreased more often than it is increased, so usually returns should be even greater.

**Pustak Raj Oja** also from CSP noted that SRI had now been used in Nepal for a period of four years, with many good results. More effort should be made to promote SRI, and the Western Region should be included. (That most SRI activities have been in the Eastern Region is a matter of happenstance; they have depended on volunteer efforts wherever these could be mobilized.) Government and NGOs need to make opportunities for small and marginal farmers, Pustak said, because landholding fragmentation continues. SRI efforts should be taken up by the NARC, and it and civil society should work together on this to build confidence among farmers.

I was then asked to make a presentation to conclude the forum and gave a powerpoint talk that included some of the most important research results. I began by discussing the role of civil society in the development and spread of SRI, starting with its synthesis by Fr. Henri de Laulanié in Madagascar. In addition to discussing the principles and performance of SRI, I suggested that SRI is an innovation which is particularly suited to the 21<sup>st</sup> century, when land and water resources per capita will continue to decline, and when agricultural systems will need to utilize these basic resources more intensively and more productively. Rising energy costs will make land-extensive production more costly, so intensification is a better strategy. Also, we will need to have practices that are 'cleaner' in terms of maintaining soil, water and air quality.

I noted that I had seen many changes in Nepal since I first visited this country 35 years ago. The world in general is changing: people are more educated; societies are becoming more democratic, and also more participatory, and more dynamic. SRI should be presented and promoted in different ways than agricultural innovations in the 20<sup>th</sup> century. Then farmers were regarded as *adopters*, as persons who were expected to accept and utilize whatever was presented to them through extension systems.

In SRI, we expect farmers to be *partners*, to understand and improve upon the methods that are offered to them, adapting and fitting these to their own local conditions so that the very best use is made of available resources. Also, innovations such as Govinda Dhakal's hand weeder are expected and necessary. In the process, farmers will become more confident and knowledgeable decision-makers and managers. SRI is thus about human resource development as much as it is about producing more rice, a theme that we have often voiced in various countries.

**Biresh Rai**, a farmer from Sundarpur, gave a vote of thanks, saying that the SRI program will be a success and will help to eliminate poverty in Nepal. (I would have said, more modestly, that we think it can eliminate food insecurity; but SRI should contribute also to this broader goal.) He thanked Rajendra for organizing this forum, me for coming from abroad, and everyone else for attending.

**Prem Prakash Uprety** spoke in closing as the most senior government official present, being Local Development Officer for Morang district. He said that he had come to learn more about SRI and had learned a lot. The government is presently preparing its next plan with the foremost goal of minimizing poverty in Nepal, and SRI should be a major component of this effort. He thanked the District Agricultural Development Office for its commitment and concern for farmers in promoting SRI.

Prem said SRI spread should be replicated in multiple ways, suggesting that if each year there can be a five-fold expansion, with each SRI farmer will introducing it to five other farmers, soon all of Nepal could be benefited. Prem said that he was ready to help from his side to achieve “drastic results,” even “surprising results,” all with the aim of reducing poverty.

Rajendra thanked Prem and everyone else for their contributions to the forum, and the large group began to disperse. Some had long distances to travel home, and the next day, Sunday, was the start of the work week. (In Nepal, Saturday is the designated ‘day of rest’). Pustak Oja who heads DFID’s Community Support Programme in eastern Nepal, which is already supporting SRI work in Dhankuta district, told me that the CSP is now planning the next phase of its program and will include SRI work on a larger scale, including Terathun and Panchthar districts. This will be a welcome expansion of support for SRI work.

That evening, I had dinner at Rajendra’s home located in an apartment behind the DADO office, and the next day we flew together to Kathmandu to participate in the 4<sup>th</sup> international seminar of the Farmer-Managed Irrigation Systems (FMIS) Promotion Trust, November 6-7..

### **Follow-Up SRI Activities in Kathmandu**

The FMIS Trust was established to promote research and the accumulation of knowledge about farmer-managed irrigation systems in Nepal and also to improve their performance, giving recognition both to eminent researchers on this subject and to outstanding farmer systems. The founder of the Trust, **Dr. Prachanda Pradan**, has been a friend and colleague since 1971. For three years we worked together on behalf of Cornell as consultants with the Nepal Irrigation Management Project funded by USAID, introducing participatory management into agency-operated irrigation systems in Nepal.

Knowing Prachanda’s strong interest in advancing farmers’ well-being in participatory ways, I introduced him and Rajendra to each other last year via email, and when Prachanda visited SRI farmers in Morang district, he was satisfied that what I had told him years earlier about SRI was something achievable in Nepal. The current chairperson of the Trust, **Iswar Raj Onta**, another long-term friend and colleague, also took an interest in SRI, and the Trust began giving some financial support to Rajendra’s extension work for SRI in Morang district and beyond.



As part of its 4<sup>th</sup> international seminar, FMIST invited me to make a presentation on SRI and also Rajendra to report on SRI results in Morang during the second day. Water shortages are a serious problem in many farmer-managed irrigation systems, and rice is the major crop in most irrigation systems. So SRI should be relevant in irrigation systems across Nepal for its water-saving as well as for its potential to improve incomes and environments. In presenting the Trust's annual report, Iswer spoke proudly of the support it is giving to the SRI work of DADO Morang.

During the first tea break on Monday, **Dr. Madan Pariyar**, Social Inclusion Expert with the World Bank-funded **Poverty Alleviation Fund (PAF)**, reminded me that we had spoken about SRI in the Bangkok airport four years ago, after the 2<sup>nd</sup> international FMIST seminar when we were en route to other meetings. Rajendra told me that Madan has been very helpful facilitating PAF funding for SRI work. We discussed convening a seminar on SRI for PAF staff members later in the week to consider how SRI can contribute to the Fund's mandate: poverty elimination.

**Dr. Hari Dahal**, deputy director-general for technology transfer and coordination in the **Department of Agriculture**, discussed with Rajendra and me holding a seminar on SRI at the Department headquarters on Thursday. Hari, who has been very supportive of Rajendra's efforts, has applied for a Fulbright research grant to come to Cornell next year on a sabbatical leave from the Ministry. The climate of opinion within the Department is becoming more and more favorable to SRI as good results keep accumulating and as reports of farmer satisfaction come in.

I missed on Monday afternoon a presentation by **B. Sada Siva** and **N. Rajasekaran** from the **DHAN Foundation**, an offshoot of a larger Indian NGO PRADAN which has been promoting SRI in northern India. They are, respectively, team leaders for DHAN in Hyderabad and Madurai in southern India. I did not know that their NGO has been introducing SRI in community tank irrigation schemes in Andhra Pradesh and Tamil Nadu states -- with good results, they both said. When we met the next day we discussed their participation in the upcoming all-India SRI symposium being held in Hyderabad, November 17-18.

Rajendra's and my presentations on Tuesday were well-attended and well-received. One of the pleasant surprises afterwards was to learn that one of the farmers attending the seminar, **Ramashraya Prasad Shah** from Prashtoka VDC in Bara district, has been using SRI methods for seven seasons and is actively engaged in SRI promotion within Nepal. He learned about SRI from the NEDECO technical assistance team headed by Bob Davey that helped improve the management of the Sunsari-Morang irrigation system. Ramashraya has one hectare of his two hectares of rice land under SRI and has gotten yields as high as 11.2 tons per hectare, although usually the yields are in the 8-9 t/ha range, he said.

Ramashraya is now doing direct-seeding rather than transplanting and is quite satisfied with this. He said that he has no problem with weeds because he makes a pre-emergence application of a weedicide. He plants sesbania and mungbeans as intercrops and also adds urea (5 kg/kattha, i.e., 150 kg/ha) in a split dose, first as a top-dressing and then as a basal application. He applies also 3 kg of diammonium phosphate (DAP) and 1.5 kg of muriate of potash (KCl), plus micronutrients (300 grams per kattha, or 9 kg/ha). He said that he has been reducing his application of inorganic nutrients as his soil fertility improves with SRI.

Ramashraya has been helping other farmers learn about and use SRI methods. Fifteen of his neighbors have taken up SRI this year, he said, and the **Department of Irrigation** has begun taking him to other districts to spread SRI. He said that thus far he has been to 50 districts under DOI auspices, a number hard to believe since there are 75 districts in all of Nepal. I hoped to be able to get some confirmation of this, but that the DOI is making such efforts was news to me and very encouraging. I did get confirmation that such a DOI effort is on-going.

Ramashraya operates a very intensive farming system, with six crops a year, only one of them rice. He also grows, in sequence, horseradish, potato, peas, chillies, and cucumber. This rotation contributes to diversified root exudations and to soil biodiversity. Ramashraya said that with this strategy, he can reliably earn at least 20,000 rupees (\$285) per kattha (330 m<sup>2</sup>), and as much as 50,000 rupees (\$715) per kattha.

With Ramashraya was **Ram Prasad Mehata**, acting president of the National Federation of Irrigation Water Users' Associations in Nepal (NFIWUAN), who is a farmer from Ineruwa north of Biratnagar. He and other farmers in his community have begun using SRI, he said, after learning from Ramashraya. Ram Prasad, who has been supporting Rajendra's work on SRI in Sunsari district, invited us to visit the NFIWUAN office in Kathmandu the next day.

Participating in the FMIS seminar was a delegation from **Afghanistan**. National project coordinator and chief engineer for the FAO's Emergency Irrigation Rehabilitation Project, **Sayed Sharif Shobair**, expressed interest in starting SRI evaluations in his country, and we agreed to exchange information. I said we could arrange to host a delegation of farmers and technicians from Afghanistan if they would like to see SRI practice in India, Bangladesh, Nepal or Sri Lanka.

**Prof. Tofail Ahmed** from the Department of Public Administration at Chittagong University said that he would like to promote SRI demonstrations in areas of **Bangladesh** where he is currently working with the Small-Scale Water Resources Development Sector project. We had first met in 1985 when I visited the Bangladesh Academy for Rural Development at Comilla, and he has established long-standing connections with communities around Comilla that could be drawn on to facilitate SRI introduction.

At lunch on Tuesday, **Ramesh P. Koirala**, engineer with the **Praganna Irrigation Project** in Dang district, expressed his satisfaction with SRI. He reported that Ramashraya Shah had introduced SRI to farmers there. Ramesh subsequently sent me a written report by email so that I could have more details. The effort started with just two small SRI demonstration plots on 4 katthas (0.13 ha) the first year. The next year there were **67 ha of SRI planted, 400 times more area**, some of it basmati rice. The first two SRI yields were 9.72 and 11.25 t/ha, impressively more than the 8.55 and 9.54 t/ha achieved with another methodology evaluated (alternative wetting and drying with 25-day-old seedlings). The report that Ramesh sent me concluded that SRI methods are tripling usual rice yields, with a crop cycle that is two weeks shorter and with a 20-fold reduction in seed requirements.

On Wednesday morning, I had breakfast at the hotel with **Rajeev Rajbhandari**, a graduate student at the Institute for Agriculture and Animal Science (IAAS) at Rampur. He is doing his thesis research on SRI methods with some support that I was able to provide from my Cornell

research funds. His IAAS professor was initially rather negative toward SRI, so Rajeev's research design had to be modest in scope. But his trials have clearly shown the beneficial effects of SRI practices, so this has made his professor and other faculty and students at IAAS more favorably disposed toward SRI. Also, Rajeev has been showing the trials to farmers visiting the IAAS campus. He wanted to discuss how the research could be expanded and how SRI could be promoted on a larger scale.

With Rajeev was another graduate student from IAAS, **Ms. Janani Thapa**, who has taken an active interest in SRI even though her thesis research is on participatory forestry management. She has assisted Rajeev with his trials and would like to introduce SRI to the extremely poor households with which she has been doing her research in Rupandehi district.

These households have very little land, just 2-3 katthas (0.07-0.1 ha). However, since their landholdings are often located close to the forest, they have access to biomass that could be used to build up their soil. Possibly their plots have a good endowment of soil organisms compared to the soils under control of richer households that rely heavily on chemical fertilizer applications.

We calculated that if a poor household can through good and intensive management achieve a yield of 10 tons per hectare, this could enable it to become self-sufficient for its staple food. Poor households presently are able to meet their basic food needs for only 4-5 months per year. This forces them to sell their labor at very low wages to meet their food requirements. If by having at least their basic food needs assured they could afford to hold out for better wages, this would make their labor also more remunerative. We discussed how trials and demonstrations could be done in Rupandehi to help these households use SRI to reduce and maybe even end their current food insecurity. That would be a worthy challenge and application for SRI.

In the afternoon, Rajendra and I visited first the headquarters of the **National Federation of Water Users' Associations in Nepal** (NFIWUAN) in the Purano (Old) Baneshwor section of Kathmandu. There we met with Ram Prasad Mehata, acting president of NFIWUAN, **Ram Lakhani Harijan**, the federation's secretary-general, and seven other members of the national executive committee or secretariat. I was pleased to learn that protecting water quality is now one of the federation's active interests, with some modest donor support.

Rajendra and I used my laptop to make, in brief, the same presentations that we had made the day before to the FMIS seminar. There was considerable interest in SRI practices, particularly in their extrapolation to other crops. We were not sure as we left, however, what kind of follow-up there might be. SRI should be of interest to most the federation's members because rice is the main irrigated crop in Nepal. But the federation's main activity is lobbying the government for more favorable policies, so there were no evident means for doing any training.

We then walked three blocks to the headquarters of the **Federation of Community Forest Users in Nepal**, (FECOFUN) where we met with its chairperson, **Bhim Prasad Shrestha**, and its member-secretary, **Bhola Bhattarai**. This is one of the most remarkable organizations in the world, having started about 15 years ago as a grassroots initiative for communities to gain legal rights to manage the forest resources in their respective areas. The process of transferring responsibility from the government to forest users' groups was given legal sanction in 1988.

There are now about 14,300 community forest user groups in Nepal, 11,000 of which have chosen to become members of the national federation. These user groups have 1.5 million households as their membership, which means that FECOFUN represents about 7.5 million Nepalis, more than one-quarter of the country's population. It has district federations in 73 of the country's 75 districts. Just a few days before, FECOFUN hosted an international seminar with participants from forest user groups in other countries. It was evident that no other country has an organizational structure as large and as encompassing as FECOFUN's in Nepal.

During the recent years of political unrest and conflict, when the local government system pretty much collapsed, and the presence of central government agencies in rural areas was crippled by Maoist attacks and threats, forest user groups became in many areas, de facto, the only functioning local capacities for decision-making, resource mobilization, communication and coordination, and conflict resolution. So many tasks of local governance fell to them. With only a few exceptions, Maoist guerilla forces refrained from interfering with these local institutions.

Since rural local organizations have been the focus of most of my professional work over the past 30 years, visiting FECOFUN headquarters was like making a pilgrimage. It was evident that the building is a center of real activity, more than could be seen in the NFIWUAN offices.

Our discussion was mostly about the forest user groups and about ways in which grassroots organizations can be most effective. However, we also talked about SRI, and there was considerable interest expressed. Rajendra will be in touch with FECOFUN about how some SRI training could be incorporated into the federation's extensive decentralized training programs.

Thursday morning, Rajendra and I visited the **Poverty Alleviation Fund**, where Madan Pariyar had arranged for a presentation on SRI. Many of the PAF district managers were present for a two-hour discussion. The PAF executive director, **Raj Babu Shrestha**, assured us that his agency plans to expand its support for SRI because of the potential that it has for reducing poverty, which I had addressed in my remarks.

Then we visited briefly the **National Agricultural Research Council** headquarters to meet with some of the rice specialists there. We met first with **Chiranjibi Adhikari**, coordinator for Cornell University's activities in Nepal under the Soil Management Collaborative Research Support Program (SM-CRSP) funded by USAID. He then took us to the office of **Dr. Bhaba Tripathi**, who manages the IRRI office in Nepal which is located at NARC. I met there also **Dr. N. P. Adhikari**, coordinator of the NARC National Rice Research Program, and several other rice scientists, and we had a brief discussion of SRI sandwiched in between formal presentations. Dr. Tripathi said that he had been supporting SRI for several years, and he came along with us to the following presentation on SRI at the **Department of Agriculture**.

We got to the Department by 2 o'clock, but the program could not start until the director-general **Dr. Deep Bahadur Shuwar** was able to arrive. Then there were also a few delays because of electricity interruptions that stalled the powerpoint presentation. However, there was a very good turnout, about 50 staff, especially considering that budget preparations were preoccupying Department personnel at the time. Rajendra noted that many senior officials came. In his

introduction, Dr. Dahal described my SRI efforts as “more of a passion than a job,” a characterization that I could not disagree with.

This was probably the most important group that I was able to speak to about SRI during the visit to Nepal. The concrete experience with SRI in Morang district that Rajendra could add and could communicate directly in Nepali made what I presented more credible and motivating. The director-general in his closing remarks, like his counterpart with in the PAF, assured us that the Department of Agriculture is pleased with the opportunities that SRI is opening up in Nepal and will support their expansion.

My suggestion that SRI concepts and practices may help to increase the yields and productivity of other crops was well-received, as was my suggestion that SRI experience is pointing out some new directions for development of an agricultural sector more appropriate to 21<sup>st</sup> century conditions. There is need to have production techniques and to employ factor proportions that match the country’s conditions and needs. Currently favored technologies are more energy-intensive, land-extensive, input-dependent, and environmentally-adverse than is likely to be optimal, and they continue to be beyond the reach of resource-limited farmers.

Poverty reduction and food security are the priorities now shaping government plans and policies, and SRI fits well with these. Afterwards, there were expressions of support from several persons who attended the seminar. **Dr. Madhav Joshi**, chief agronomist of NARC, gave me his card and asked to be kept informed, and **Dr. Jagat Devi Ranjit**, a weed scientist with NARC, gave me hers. She introduced me to other staff in her unit who had attended. Since weed control is one of the main constraints for SRI adoption, their involvement is more than welcome.

To cap the day, Rajendra and I went to a Cornell reunion that had been arranged at a hotel in Thamel. A dozen alumni and friends of Cornell were there, many of them former students or advisees of mine, assembled for snacks and reminiscences. Several have been following and encouraging SRI, such as **Mahesh Banskota**, former deputy director-general of the International Centre for Integrated Mountain Development. ICIMOD introduced SRI in northern Pakistan in 2003 and also sponsored participatory SRI development with farmers in the Jhikhu Kola watershed in the middle hills of Nepal as noted above.

The next morning, Friday, **Shree Krishna Uphadyay** sent a car to bring me to the office of the NGO that he now heads, **SAPPROS-Nepal** (Support Activities for Poor Producers of Nepal). Shree Krishna was a very innovative manager of the Agricultural Development Bank of Nepal for many years before his retirement, when he turned his energies to anti-poverty efforts in the NGO sector. I had not known that he is on the board of directors of the Poverty Alleviation Fund, and that it was he who encouraged PAF to get involved SRI -- after learning about it during a visit to Cornell University four years ago. Networking works in many ramified ways.

SAPPROS is working in very poor hill districts such as Bajhang and Bajura in Seti zone in the Far Western Region. Its efforts to introduce SRI have gone very well, Shree Krishna reported. They started with just four farmers in Bajhang, and this number increased to 18 the next season because farmers could see the higher yields gotten with less seed and less water and with no need to purchase fertilizer, which is expensive and difficult to get in hill areas anyway. Given that SRI

has given the farmers who have tried it tripled yield, Shree Krishna anticipated that the number of SRI users in the area could increase by as much as 20-fold in the next season.

SAPPROS works in a number of food-deficit districts where the World Food Program is flying in rice to reduce severe hunger. The Nepal government is paying 70 rupees (\$1) per kg for the transportation of rice. Rajendra has been emphasizing that this expenditure could become unnecessary if SRI methods are adopted. Donor and government funds would be better spent on strengthening SRI and irrigation systems, rather than keep spending so much on palliative measures. Shree Krishna expected that the PAF will expand the use of SRI considerably in high-poverty areas. It was good to know that SRI methods were performing as expected in higher-elevation areas, >1,500 meters, not only at much lower elevations in the terai.

We had an interesting discussion about the use of SRI with traditional rice varieties. I showed him pictures of large productive traditional rice plants being grown in Madagascar with SRI methods, as tall as the farmers and with huge panicles not falling over. He told me about a much-favored aromatic traditional variety, *haus raj*, whose name means literally ‘royal white duck.’ I was pleased to hear that it grows very well with SRI.

I told Shree Krishna about CIIFAD’s collaborative initiative to promote SRI production of indigenous rice in Madagascar, Cambodia and Sri Lanka which was given a SEED award from IUCN, UNEP and UNDP in 2005 [<http://seedinit.org/mainpages/ceremony/winners/index.php>]. This effort seeks to enable farmers to get a very good price for high-quality organically-grown rice. He was interested in this as a way to reduce poverty. He had already been thinking about how to facilitate the sale of SRI *haus raj* in Kathmandu markets where it should get a good price. If there can be even more remunerative export sales, so much the better for poor farmers.

We talked about other ways in which poverty could be reduced, though water harvesting, through community granaries, through micro hydroelectrical generation, and other means. What was most encouraging was to have confirmed my impression that rural communities in recent years have become more confident and more assertive. He said that this was in part prompted by the political strife going on around them, when they had to assume more responsibility to survive.

This week saw major political shifts, regarded by most as salutary, in both of our countries. In the U.S., the control of Congress passed back into the hands of the opposition party, creating a check on the fiscal, foreign and other misadventures of the current administration. In Nepal, the Maoist guerilla movement agreed with the seven main political parties to implement a ceasefire that ends a decade of violence, with what should be an effective disarmament agreement.

We both saw reason to be more hopeful about future prospects in our respective countries. Given that SRI is succeeding in a wide range of agroecosystems, it should provide greater opportunities for combating poverty and food insecurity, provided that institutions in the government and non-governmental sectors are prepared to utilize the productivity ‘windfall’ that SRI is bringing.