

TRIP REPORT FROM SRI VISIT TO JHARKHAND STATE OF INDIA, JANUARY 4-6, 2012

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In conjunction with a visit to Tamil Nadu state to participate in an international conference at that state's agricultural university (TNAU) commemorating a century of rice research in India, my wife Marguerite and I made a preceding visit to the state of Jharkhand, invited by **Dr. Subir Ghosh**, General Manager for the Jharkhand regional office of the **National Bank for Agriculture and Rural Development (NABARD)**, who has supported SRI dissemination in the state (for which Ranchi is the capital). He was assisted in planning and managing the visit by **Binju Abraham**, who is coordinator for a number of programs in Jharkhand state for the national NGO **PRADAN** which has pioneered SRI in many places. The Tamil Nadu visit is reported separately, as is the subsequent Round Table meeting of the National Consortium on SRI (NCS) convened in New Delhi on January 13.

Background: **NABARD** has taken on the support of SRI in a number of states across India, funding the activity of NGOs like PRADAN which are undertaking SRI training and technical support directly while also training and supervising other, usually local NGOs, with the aim of expanding SRI use on a wider scale. In Jharkhand this past year, the second year of NABARD's pilot program for SRI, five NGOs including PRADAN acted in the first role, assisting another 49 smaller NGOs in the second role. Subir credits Mr. M.V. Ashok, NABARD's former Chief General Manager (CGM) for the Jharkhand office with giving the promotion of SRI a big push in the state.

The current and relatively new CGM, **Dr. S. Saravanavel**, showed his interest in SRI by accompanying us on the field visits, to acquaint himself better with what is going on at village level. He also played an active role in the state-level SRI workshop held on Friday, January 6, in Ranchi. NABARD's pilot program for SRI will be winding up soon, as it was undertaken as a pilot to demonstrate the feasibility and benefits of SRI management under Jharkhand conditions. The workshop in Ranchi was planned in part to develop ideas and support for a next phase of SRI activity, getting the state government more informed about and involved with SRI for it to expand its role.

PRADAN was the first Indian NGO to begin working with SRI, in 2003 in Purulia district of West Bengal. (For an evaluation of this initial program, done by a team from the International Water Management Institute, see <http://www.sciencedirect.com/science/article/pii/S0378377406001703>). Since then, PRADAN has spread SRI activity to the states of Jharkhand, Chhattisgarh, Orissa, Rajasthan and particularly Bihar, which Marguerite and I had visited 10 months earlier.

Thanks to excellent results in Gaya district of Bihar and then to the state government's taking over SRI promotion with and through NGOs, Bihar has become the most dynamic SRI program in India, with a target coverage in the coming 2012 kharif season of 1.4 million hectares, 40% of the state's rice-growing area. Momentum for SRI spread will surely be increased by the world-record paddy yield reached by one Bihar farmer in the 2011 kharif season, measured by Department of Agriculture staff -- 22.4 tons/hectare, almost 10 times the usual average in Bihar of 2.3 tons/hectare (*The Pioneer*, Oct. 27, 2011: <http://www.dailypioneer.com/nation/23641-bihar-farmer-beats-world-in-paddy-cultivation.html>).

SRI work has not advanced as much in Jharkhand state as in Bihar, but NABARD and PRADAN as well as some other NGOs like SPWD and KGVK, as well as the state government itself working with the central government's National Food Security Mission (NSFM) and other programs, are engaged in SRI promotion in most districts of the state. Marguerite and I were interested to know more about the experience in Jharkhand and to pass along any information and encouragement that could help the effort progress.

Jharkhand is one of the poorest and least-developed states in India, with about 30% of its population being ethnically tribal. At the same time, it has substantial underground mineral wealth. Of course, wealth co-existing with poverty is hardly an unprecedented situation in India or elsewhere. The political situation has been unhelpful for development as partisan dissension has led to the state's being for several years under Presidential Rule, meaning that executive authority was exercised by an appointed administrator rather than by a Cabinet responsible to state's Legislative Assembly (Bidhan Sabha). There has been a recent return to relative normalcy, and we were pleased that the state's Chief Minister attended the SRI workshop on Friday as its Chief Guest, and he strongly endorsed SRI extension and use.

Marguerite and I were looking forward to seeing Binju again as he had spent two years previously at Cornell (2006-08), studying for a master's degree in international development under a Ford Foundation fellowship. Having served as his academic advisor, I was interested to see his work in the field. There was apprehension that, given the frequent heavy fogs that settle in in north India during January, we would not be able to fly from Delhi to Ranchi on Wednesday morning as scheduled. But this flight went on time, and we were met at the airport by Binju and Subir. We proceeded to the Capitol Hill Hotel to leave our bags before proceeding on the first field visit planned, to a sustainable agriculture training centre at Rukka, 15 km northeast of Ranchi, operated by the NGO **Krishi Gram Vikas Kendra (KGVK)**.

Visit to KGVK, a Social Enterprise for Inclusive Growth: This is how the NGO, which receives considerable support from the Ranchi-based company **Usha Martin Ltd.**, describes itself (<http://www.kgvkindia.com/>). Over the past 50 years the company, starting from a small local base, has grown significantly, to become a major international wire products conglomerate with operations on five continents and with annual business of \$6 billion. Before other companies, the Usha Martin Group (UGM) started supporting innovative rural development work some three decades ago, demonstrating 'corporate social responsibility' before the CSR concept was even articulated and popularized. One of the Group's founders, **Brij K. Jhavar**, now vice chairman of UGM and still actively involved in the Center's program, greeted us when we arrived. So did the executive director of **KGKV Agro Ltd., Rajesh Singh**, with about 50 other persons, Centre staff and cooperating farmers.

We made a walking tour of the Center's testing and demonstration plots, seeing SRI ideas being adapted for a number of crops, including (to my surprise) **vetiver grass**, a plant with economic value for the essential aromatic oil that can be distilled from its roots. Magnificent tomatoes were seen being grown under netting, stretching upward on trellises 15-20 feet tall. Experiments are ongoing to compare and improve crop establishment of rice, wheat and other crops with **direct-seeding** vs. transplanting. Of special interest was the evaluation of water saving and crop productivity when using **sprinkler irrigation**.

When we entered the Centre's main building, we reviewed a line-up of simple implements developed by KGVK Agro Ltd. to support new crop management systems. I already knew about the **Krishi Usha Weeder (SRI)** which was "launched in 2009" -- but the **Krishi Usha Weeder (SWI)** for inter-cultivating wheat and other upland crops was new to me. The KGVK brochure said that both of these were developed: "With Technical Input from Usha Martin Ltd. & Farmers' Insight." This non-profit company in addition to three varieties of weeders, sells a seed drill developed for SWI, a seed dibbler for other crops, and several non-farm machines for silk production (reeling, spinning, twisting). It is not yet making and selling roller-markers because in this region with mostly rainfed cultivation, the soil-water conditions in rice paddies are not very suitable for this particular implement. The company also manufactures and sells spare parts for its implements, which is an important service and business.

Most of the over 50,000 farmers in the service area for KGVK have less than 1 acre of land, usually distributed among fragmented holdings. KGVK also has education and health programs to complement its agricultural work. It considers SRI as 'a big opportunity' for introducing improvements in the villages. KGVK started its SRI work with 6 farmers in 2006-07, with use expanding to 34 the next year. Since then, acceptance has been reasonably rapid:

- 1,287 farmers in 2008-09;
- 2,241 farmers in 2009-10;
- 1,667 farmers in 2010-11 (a drought year in which many farmers did not grow rice at all);
- 3,099 farmers in 2011-12; and
- 7,865 farmers in the current year.

The constraints identified by farmers for the adoption of SRI have been: lack of quality weeders, a constraint now remedied; undulating land which makes for waterlogging in some areas and water scarcity elsewhere; and the heavy burden that women carry in agricultural production. With SRI and other interventions, such as a kitchen-garden kit that has 21 kinds of vegetables and greens, KGVK figures that a household with 0.75 acre of land can add 110-150 days of food security to its current situation. The discussion with farmers and staff went on for almost an hour after the walking tour, with concern particularly for reducing labor requirements and labor-saving implements, something that KGVK has been focusing upon. By 6 o'clock it was dark, and we returned to Ranchi for the evening.

A Visit to Contested Territory

Next morning, January 5, we left at 8 to drive more than two hours to the fairly remote and rather poor village of **Sonpur** in Arki Block, Khunti District. This is largely inhabited by households of the Munda tribal group. PRADAN first started working with villagers here in 2006. When its staff introduced methods in the first year, there were no farmers willing to try out SRI. Fortunately, some Munda farmers in Khesibera village not far away had started SRI practice, and PRADAN staff could arrange for a visit there. The next year, seven Sonpur women in the nascent Self-Help Groups (SHGs) were willing to experiment with SRI methods, although only five of them were able (or willing) to persevere with these for the whole season.

Those who persisted in 2007 were rewarded with average SRI yield of 7 tons/ha, compared to 1.75 tons/ha with conventional methods. This four-fold increase elicited a lot of enthusiasm in Sonpur among both users and non-users. The next year, 27 households tried the methods, and their average productivity was 6.8 tons/ha. In the third year, 53 farmers adopted SRI methods on 6 ha of land. Then in 2010, 72 farmers practiced SRI on 14 ha. Sadly, this was a year with almost no rain. But the SRI plots were the only ones to give any yield, and 7 farmers were able to harvest SRI yields of over 8 tons/ha.

This encouraged all 110 households in the village to become SRI practitioners in 2011, with all of the village's lowland paddy area planted according to SRI methods. This has made Sonpur one of the exemplary villages in the region. Some scenes from Sonpur were included in a video on SRI, *Ek Ropa Dhan*, that received the *Rajat Kamal* prize as 'best documentary' at India's 58th Annual National Film Awards in 2011.

Sonpur is now food-sufficient. Farmers have told PRADAN staff that the features of SRI which they most appreciate are: less inputs of seed and water are required; young SRI plants can better withstand the dry spell of 20-30 days that usually occurs after planting; and the yield of straw for fodder and fuel is also higher along with greater grain production.

The challenges which farmers report include: handling the young seedlings and planting with precise spacing; keeping the young plants growing during the dry spell; and managing alternate wetting and drying. Villagers of Sonpur are now extending adapted SRI methods to their midland and upland rice-growing areas, and they have set a goal of reaching 10 ton/ha yields within two more years.

Because Sonpur lies within a part of Jharkhand state that is contested by Naxalite forces, our visit had involved a lot of planning, Binju told us. It had been decided that the visit should be 'unofficial,' with no police escort as that could be provocative. Instead, we drove directly and unobtrusively to the village, where we were met by the PRADAN field staff and several officials including the Block Development Officer (BDO), who is well-regarded because of his concern for local improvement, as well as by a large number of villagers.

First, village women brought garlands of marigolds for Marguerite, myself, Subir, Binju and the BDO; then men with huge drums welcomed us and accompanied us as we were led to the village square. There we were seated on the edge of huge woven mat, which was soon occupied by dozens of SHG, dressed in their best saris and jewelry for the occasion.

We were treated to entertainment provided before the open meeting started. As the drummers settled themselves on the edge of the square, masked figures began appearing, with feather headdresses and colorful costumes, starting with the Hindu god Ganesh accompanied by two Rakshasas (demons) as guardians. This was the famous Munda tribal *Chhau* (or *Chau*) dancing. Various 'animals' joined in the melee of figures moving across and within the square. Most notable were a peacock and a (two-person) lion which leaped, romped, and rolled over on the ground with amazing coordination and agility.



We started by asking the seven women who pioneered SRI use in the village to stand up and be recognized as 'heroes of SRI,' receiving considerable applause. There were reports from leaders of the respective SHGs in Sonapur. Most had between 10 and 20 members. The SHG names were charming: Silver, Rose, Queen-of-the-night (a local flower), Peace, Sunflower, the name of a local goddess.



Why had they joined into Self-Help Groups? I asked. "To develop the village," was the answer. One leader said that when they were first approached by PRADAN staff, "We were too scared. We never used to come together as a group. But our husbands said it was okay." I led a round of applause for the husbands, who were sitting quietly on the side of the square, getting no attention, probably difficult for them. Although this is a tribal community, in which men's and women's status is normally more equal than in most Indian villages, from the *Chau* dance one could tell that it was fairly Hinduized and patriarchy is the rule.

"We had to keep our assets mortgaged to the moneylenders," another woman said. "But we wanted to have assets of our own, since we needed money for stressful situations like health emergencies." What was the rate of interest paid? "Two per cent per month," was the answer. Do they still need to go to the moneylenders? "Now our money is sufficient," one woman said, with many nods. Possibly this was said to please the visitors. Another woman explained that their SHGs could now go to a bank for group loans. "Our first group loan was for 25,000 rupees (\$500), but we repaid this," she said, "and our second loan was for 250,000 rupees (\$5,000)."

The first loan was used to acquire six young goats, for Rs. 1,200 each. Four of these were sold when grown for Rs. 4,000 each. The amount of this sale, Rs. 16,000, covered most of the loan. The number of goats has now been expanded to 21. The big project of the group is now establishing a mango orchard, which we visited on our way out of the village. The women said that they no longer have to take loans from moneylenders, now able to meet their cash needs through the SHG savings and loan operations.

The most impressive part of the visit was to learn about the women's village development planning. A large map of the village was brought out of a fabric bag and proudly spread out on a fibre mat between them and the visitors. All of the land cultivated by the 110 households was shown, along with various stretches of uncultivated land and wasteland that was common property. In this tribal village, property is not privately owned, but de facto there are usufruct rights to specific plots of land, classified locally as lowland, upland, or midland. Given the undulating topography of the region, the lowland areas are quite limited, and greatly valued because these are irrigated or irrigable.



The women showed us a series of plastic overlays that they put onto the master map to show us the expansion of their SRI use, from 7 farmers in 2007 to all households now. The overlays showed the midland areas where SRI methods are being extended without irrigation facilities, using pumps to lift water to these areas. They had 26 hectares under SRI management this season. They have had yields as high as 416 kg per acre, which comes out to be 10.4 tons/ha.

The women said that at first the labor required for SRI was "very high... But now that we have learned the methods, it is now easier." They appreciated particularly the introduction of the mechanical hand (push) weeder, which the women prefer to hand weeding. Almost all are getting yields three times more than before, we were told. This was not data that would be accepted as scientific evidence, but the statement was made publicly, and there was no indication of disagreement. All farmers were skeptical at first, someone said, "but now we joke that you have to bring an axe to harvest."

My question about whether there was any disadoption of SRI was met with incredulity. The response was that not a single household has given up SRI practice after trying it. "This is the wrong question to ask in this village," Binju commented. The farmers here are helping to acquaint farmers from neighboring villages with the new methods. They are still somewhat hesitant about trying SWI, the adaptation of SRI concepts and practices to wheat production, now being taken up elsewhere. But a few are trying it this winter season, and if they succeed, there should be a similar spread.

Farmers are using both compost and fertilizer, as the soils here are considered very poor. Eighteen households are making and using vermicompost (enriched compost made with the assistance of worms). One woman asked about her problem of some rice plants dying back at time of panicle initiation. Binju thinks this is due to the timing of urea applications at this stage of crop growth.

How many households are now self-sufficient in food? Most of the women's hands went up. Some households now are producing a surplus we were told, and one woman complain publicly about the price they receive for their sales, just 8 rupees per kg. The Block Development Officer, who was with us, said that they should be able to sell their rice to the government's procurement agency for 10.75 rupees per kg, and he told them where to take their rice for sale.

I suggested that the SHGs begin adapting their new ideas to the production of other crops, both for their own families' nutrition, but also for more and more secure income. Their venture into goat production was a good start, and Binju talked about the mango group enterprise. In the winter season, SHGs members are producing potatoes, mustard, black gram, cabbage and many other crops for cash income.

We wished the women success in their many ventures, and thanked the men for their support of the SHGs' initiatives, and thanked the whole village for the very memorable reception, including the drumming and the dancing. After taking leave, we drove back along the rutted road, stopping to see the mango orchard taking root, literally, and then visited the Block Development Officer's office for a few minutes, seeing how paltry are the government's facilities here on the periphery of its reach. The BDO's office had a plaque with the names of all the incumbents since the 1950s painted on it. The average tenure was less than 1 year. However, the present incumbent was already the third longest-serving BDO, having been there two and a half years, an indication of his determination and even courage.

We drove by several primary schools, surrounded by barbed wire and other fencing. These had been taken over by security forces for accommodations as they tried to suppress the Naxalite forces. This was an indication of how much under siege the state apparatus is in this region. The educational opportunities that have been one of the villagers' best avenues to improve upon their insecure and impoverished existence have been diminished as a casualty of conflict.

New Opportunity: The System of Lac Intensification

While these observations were depressing, a few miles from the BDO's office we witnessed something quite remarkable and promising. Few people know where the material known as **lac** -- the main ingredient for lacquer, varnish and shellac paints or for lacquer carvings or jewelry -- comes from. This is an entomological product, as lac insects when they burrow in the bark of trees or shrubs secrete a red-colored resin, which can be collected and purified to use in various products. One of the main current demands for lac is to make an organic spray that can be used to coat the surfaces of fruit like apples and pears, keeping them from becoming dehydrated during the shipping, storing and displaying in stores. At present, world demand exceeds supply, so the price is rather favorable, even the 'farmgate' price for collectors, about \$10 per kg.

Collection of lac is very labor-intensive and has been done by only the poorest of the poor, who have low opportunity costs for their labor. Fortunately, lac can be produced on land that is too poor for agricultural production, since the trees and shrubs needed to raise the bark-burrowing insects can grow almost anywhere. Jharkhand state is the world's leading source of lac, as poor farmers or even landless households can collect lac resin from trees and shrubs on wastelands.

Binju had previously written to me about 'the system of lac intensification' (SLI) which farmers working with PRADAN assistance had developed to significantly improve the supplementary income of very poor households in a region offering few income possibilities. Since lac is produced by insects, a process fundamentally different from the transplanting and nurturing of rice seedlings, it was hard to imagine how SRI ideas and practices could be enhancing lac production. Binju therefore wanted us to see this innovation for ourselves. We stopped at a lac 'farm' near the road and were shown how Jharkhand farmers have taken three SRI principles/practices and have adapted them to improve lac productivity.



1. **Reduced populations (of plants or larvae):** Farmers have found that they get as good or better production of resin by reducing the inoculation of tree/shrub bark by 80% over what they have been doing traditionally. Like rice farmers, over time it has come to be believed that increasing the number of larvae per square meter of bark will increase production. But in fact, too many insects are being concentrated in a given area of bark, so insect health and productivity is increased by cutting the number of insects transferred to new bark areas, coincidentally by about as much as recommended for SRI. With five times more inoculation material available under SLI management, farmers can greatly expand their scale of production.

2. **Earlier transplanting:** Normally, lac farmers remove inhabited bark and graft it onto a new area of tree or shrub when the larvae first begin to hatch and come out of the bark. Prompted by their SRI experience, farmers find that there is much advantage from transplanting the inhabited bark about 10 days before the larvae begin to emerge. (a) There is little or no loss of larvae in the transfer process when they are still unhatched in the bark, whereas once they begin emerging, not all get moved to their new habitat. (b) This early transfer permits farmers often to get a second collection (scraping) of resin in a season. These two advantages also enhance farmers' incomes.

3. **Wider spacing:** Traditionally, farmers inoculated trees' bark, but they have found that inoculating shrubs gives them high labor productivity, because shrubs can be planted much closer together than trees grow naturally, and multiple shoots give a lot of bark surface area to be inoculated. However, farmers have been planting the shrubs fairly close together, thinking that more will give them more area to exploit. However, they are finding that with wider spacing of shrubs, the plants produce more tillers on a per-square-meter basis, and they can thus 'farm' lac insects more intensively. The more widely-spaced shrubs are healthier and can better support their insect parasites, presumably because of their larger and deeper root systems.

The picture above shows 'modern' lac farming with SRI concepts. The whitish-reddish extrusions on the shrub's bark are the resin from lac insects (related to scale insects and mealybugs). This gets scraped off and purified for sale as a fairly valuable product that can be produced with essentially no capital investment, just labor and skill. There is no need for land ownership as the insects' production is quick and moveable. Having some security of land tenure, however, encourages good and productive husbandry of shrubs to support the insect populations.

This product is well-suited for poor households living in environments with poor soil and even little rain. If the demand for 'organic' products worldwide continues to increase, there could be a fairly good economic prospect for this commodity. So far, synthetic alternatives have not succeeded in displacing this product. For some time to come, this could be a benefit to tens of thousands of poor households in Jharkhand and other parts of India where there is wasteland and low opportunity costs for labor.

At Cornell, we are looking forward to Binju writing his project paper on this subject for a degree from our Master of Professional Studies program on International Development. Binju knows more about this innovation than anybody else, and can give a boost to this nascent industry for the poor. So far, Indian government researchers working on lac improvement (there are a few of them) have not pursued these ideas and opportunities, still locked into a 'increase inputs to get more output' approach to agriculture, not appreciating yet the 'less can give more' strategy which derives from SRI experience.

The System of Wheat Intensification

After lunch back in Ranchi, we drove to the village of **Ormanjhi** which lies within Ranchi district. The **Society for Promotion of Wasteland Development** (SPWD) has been promoting the evaluation and spread of SWI as well as SRI here. As so often happens when a full day of activities in the field is scheduled, we were an hour behind time, and the sun was already getting lower in the sky, when we arrived, meeting several hundred waiting villagers. We were greeted with the usual garlands and drumming. Our village visit was guided by the SPWD team leader, **Sharat Singh**, who I later learned had been a classmate at Rajendra Agricultural University, the state university for Bihar, of Dr. Abha Mishra. Abha who is now at the Asian Institute of Technology in Bangkok has given exemplary leadership for SRI in Thailand and Southeast Asia. It is a small world.

We walked to some SWI fields near the reservoir (Getsud). As this was the winter season, some supplementary irrigation was being given to the fields, but farmers said just the 'minimum' of water was being applied. The crop was growing well, and several farmers jumped eagerly into the field to demonstrate their use of the soil-aerating push weeder used for SWI, an implement designed for dryland inter-cultivation. This was the first year for SWI practice, but it was prompted by the village's experience already with SRI in the summer season. Farmers said that they were using SRI ideas with a number of vegetable crops, but no details were provided. (SPWD listed these in its briefing note as chickpea, peas, pulses and mustard.)

The visit was mostly a festive occasion, without much structured opportunity for conversation. Clearly this was a very different kind of village from Sonpur, with Hindu not tribal population, and with higher levels of education and greater economic progress. The welcome was similarly warm, however.

The briefing note which SPWD had prepared gave us data on the expansion of its work in Ormanjhi and four other blocks in Ranchi and the neighboring Ramgarh district. SRI work started in 2008 with 4 villages, then with 10 in 2009, 31 in 2010, and 52 villages in 2011. In these four years, the total number of farmers using SRI methods went from 117 to 310 to 1,252 to 4,379, while the cultivated area under SRI management expanded from 19.2 to 124 to 274 to 765 hectares. SRI yields in the kharif season have been 6.0 tons/ha with local varieties, 6.1 tons/ha with high-yielding varieties, and 6.5 tons/ha with hybrids, two to three times the usual level of paddy production.

In the past two years, farmers have started growing paddy with SRI methods also in the rabi season. This crop, referred to as *garma dhan*, has given yields of 5.4-5.8 tons/ha. (This crop is confusingly referred to as 'summer paddy' because it is harvested in the summer, although it is planted at the start of winter.) The number of villages where *garma dhan* is practiced went from 4 in 2009-10 to 18 the next year, and the number of farmers increased from 135 to 923, cultivating an area of 10 ha the first year and then 108.6 hectares in the second. This is very impressive expansion of adoption.

SWI has been even more popular in rabi season, going from 7 villages to 24 villages in these two years, thanks to SPWD efforts and the method's advantages. The number of farmers using SWI methods went from 75 the first year to 406 farmers the next, on 4.8 and 102.66 t/ha, respectively. The productivity of SWI was very high, 6.5 and 6.9 tons/ha in 2009-10 and then 2010-11. The state's average yield for wheat is 1.5 tons/ha, although this area around Ranchi is somewhat higher than that average. Yields for wheat are also being at least doubled and often tripled or more.

Farmers were eager to show what they had learned about SRI and SWI, and they crowded around with less hesitation than in Sonpur. Also, it was evident that the men were more prominent here than there. But mostly the exuberance of the children impressed us. The visit would have been longer if the sun did not go down, and if we were not due back in Ranchi for a dinner meeting that evening with a variety of state government and NABARD officials. We were sorry to give short shrift to the good work that SPWD is doing and to the initiatives of farmers in Ormanjhi. But the day had already given us a lot to think about.

Jharkhand State Seminar on System of Rice Intensification

Friday morning, Marguerite and I had breakfast with about 15 PRADAN staff members who gathered at the hotel, joined by **Anil Verma**, the PRADAN team leader for Gaya district who came for the meeting and seminar. Anil has given leadership for the introduction and spread of SRI, and then SWI and SCI (system of crop intensification) in the neighboring state of Bihar.

The workshop began about 11:30 in the Hotel Capitol Hill, having waited for the arrival of the Chief Minister, **Shri Arjun Munda**, who apologized for having had some emergency that interrupted his schedule. The session was opened by the CGM of NABARD for the Ranchi region, Dr. Saravanavel, with the usual ceremonial giving of bouquets followed by the lighting of wicks on a huge bronze oil lamp.

While waiting for the Chief Minister to arrive, there was a showing of the documentary film '*Ek Ropa Dhan*' which had won a national award for 'best promotional documentary' at the India's equivalent of

'the Oscars' in 2011. The writer and director of the video, Shri Meghnad Bhattacharya, was there to introduce the film, and it was a pleasure and privilege to meet him. He was very apologetic about being not a film director but rather a social activist; but the video presentation was very well done and quite moving. It had more impact on the viewers because much of it was filmed in Jharkhand state, indeed with some footage from Sonpur village.

The program started with a presentation by **Dr. Subir Ghosh** on NABARD experience with SRI methods. In 2010-11, the second year of the program, the target number of farmers had been 29,400, with 28,975 actually participating. Against the target area of 7,350 acres, the area covered had been 7,243 acres. Detailed numbers were given of district-wide coverage. With traditional methods, average yield was 3.549 tons/ha, whereas with SRI practice, the average yield had been 6.95 tons/ha, a 96% increase. Farmers had used 16 different varieties, with SRI increases ranging from 5% (Anjali) to 252% (Kabir).

The most important information was saved to the last: how much SRI methods improved household food security compared with yields using conventional methods. The analysis assumed a family size of 5, and an average per-day paddy requirement of 3.8 kilograms. Recognizing differences in landholding size, households were classified into three groups: less than 1 acre (0.4 ha), which had an average holding of 0.66 acres; 1-2 acres (0.4-0.8 ha), with an average holding of 1.79 acres; and over 2 acres (0.8 ha), with average size of 3.73 acres (1.5 ha). Subir's presentation showed the number of days of added food security that use of SRI methods, with their higher productivity, added to households in the different categories.

Landholding size class (acres)	No. of days of food security – SRI vs. traditional cultivation		
	Traditional	SRI	Additional food security (% of year)
0-1 acre	168 (46%)	323 (89%)	155 (43%)
1-2 acres	348 (95%)	894 (143%)	546 (148%)
> 2 acres	729 (200%)	1838 (404%)	1109 (304%)

These figures were similar to those calculated from the SRI experience under NABARD's program the year before, when 5,195 farmers had participated, instead of the 28,975 this year. The previous year was a drought year, so yields were lower: 4.93 t/ha with SRI methods vs. 2.53 t/ha with traditional cultivation. Then the incremental numbers of days of food security added for the three classes were: 64, 148 and 412 days, respectively. These increases under conditions of adverse weather were perhaps even more significant, in human terms, than the 2011 results that Subir reported. These results are low-cost improvements in household welfare well beyond what most poverty-reduction programs have been able to achieve, especially in such a short time. Subir outlined a program for scaling up SRI use in Jharkhand state including facilitative policies and programs.

Subir Ghosh was followed by **Dr. R. P. Singh**, Director of Extension of the Birsa Agricultural University in Ranchi. He was professionally engaged in agricultural extension and spoke quite knowledgeably and favorably about SRI. Then a **woman farmer** who had come from Gaya district in Bihar with Anil Verma spoke to the seminar about her experience with SRI methods, having used the methods for three years. (I could not catch her name.) She farms with her parents and five sisters. The first year the rains were poor, so she could not use the methods on as large a scale as planned, but the second year she cultivated SRI rice on 2 acres, and with good rains they achieved a good crop. Usually the household had a 2-month food shortage. "Now we have surplus."

Farmers in her village are starting to use the SRI ideas with wheat (SWI), she said, having seen others' success. Her father prepares the field, and then the sisters do the field operations. "I feel very happy now," she said. "The SRI crop is easy to plant, and easy to harvest... Now we use the methods on all the fields, and we have food sufficiency."

The Chief Minister at this point asked that I make my brief presentation on SRI since he had to leave earlier than planned, to attend the funeral of a family friend, and he wanted to hear what I could tell him about SRI. Since my presentation with powerpoint slides had been prepared for 30 minutes, it was better to make an impromptu 10-minute commentary on SRI and on what I had seen and learned so far about its value for Jharkhand communities.

The Chief Minister in response expressed to the seminar participants (about 200), his appreciation for what SRI methods were doing for farmers in the state. His remarks were mostly in Hindi, not English, so I could not get much of his presentation. (A report on the seminar being prepared by NABARD will have a more complete recounting of what was said.) In his conclusion, the Chief Minister instructed (in English) the state government's Commissioner for Development, **Dr. Debashish Gupta**, who was attending the seminar, to see to it that there is continuing and expanding support for SRI work in the state. There were thus bilingual expressions of approval for promoting SRI on a larger scale.

Having given this instruction, the Chief Minister left, turning the podium over to the Secretary of Agriculture, **Shri Arun Kumar Singh**. He started by complimenting NABARD for its introduction of the new techniques, and said that Jharkhand expects to be food self-sufficient in 2012. In recent years, he noted, there had been some regression in the state's area under paddy production, mostly due to unfavorable weather conditions. He reported with satisfaction that the state government has also been promoting SRI methods, already adding another 10,000 farmers to the ranks of SRI users.

"If there is timely use of SRI methods, we can expect a doubling of yield, not just a 70% increase," he said confidently. This has really motivated farmers, he added. He talked about how in some villages there were pro- and anti-SRI groups at first. "Anti groups initially had the upper hand. But subsequently, all have joined into the pro-SRI camp, he said. "There is no anti-SRI camp any more."

Previously the view that I had had of SRI in Jharkhand, given my sources of information, focused on what NABARD and various NGOs were doing to promote it. But the Secretary stated clearly that his Department was involved in SRI work, and it was involving NGOs in this effort. SRI warrants support, he said, because it requires less inputs, and there are lesser water requirements. The state government gives certain incentives for SRI adoption: Rs. 1000 per hectare, half paid after transplanting and the other half after harvest. NGOs get Rs. 200 per hectare for their training and supervision of farmers. The Secretary stated his confidence that "SRI will be *the* technology in the future," although the state is also promoting the use of hybrids. "Please keep coming to Jharkhand," he said to me in his conclusion, asking particularly to be kept informed on further developments like SWI.

When the Development Commissioner, Dr. Gupta, was invited to speak, he deferred, saying that he was happy to continue listening. I could tell that this was not a negative response because in whispered comments (we were sitting next to each other), he made clear that he is supportive of SRI dissemination. The Minister of Agriculture, **Shri Satyanand Jha**, made a long presentation, also in Hindi so I could not follow much of it. But he did express thanks to NABARD, PRADAN, Cornell and others for introducing this opportunity in his state.

There was a break for lunch, which was very good and much appreciated, and then the seminar resumed with a panel discussion of institutional representatives and then invited comments from the floor. Much of the discussion and most of the comments were in local language so I could not capture most of it.

The observations from Sharat Singh (SPWD) from the floor were in English and interesting. He proposed that government support for SRI is more needed and justified because there are no commercial interests that benefit from (and are pushing) SRI like seed companies and fertilizer producers which backed the Green Revolution. Sharat said that SRI represented "a second Green Revolution," but it is at a disadvantage because it was knowledge-based, not input-based. Saying that varieties (hybrids) and fertilizer are consistently placed ahead of SRI in extension efforts, "SRI is in third place, when it should be in first place."

Someone representing KGVK asked to show a video on the manufacture and uses of its implements for SRI. The case was well made that having not just well-designed but also well-fabricated implements, made of durable but light-weight materials, was of great importance for spreading SRI use. He said that their program with small farmers was promoting the use of high-yielding varieties but not of hybrids, because a number of the farmers working with them have used hybrids and have had bad experiences. So, KGVK sticks with HYVs in its extension work. In particular it promotes the use of vermicompost and also of local earthworms. Applying higher amounts of chemical fertilizer doesn't necessarily bring higher yields. "Preference should be given to growing crops without disturbing nature," he said in conclusion.

Someone requested that crop breeders develop shorter-duration varieties that could be harvested sooner because, he said, conditions of climate change and weather instability are making longer seasons every riskier. Global warming means that farmers' incomes are coming down. Preventive steps must be taken. Another NGO representative spoke similarly, adding that farmers are now reading, practicing and teaching new things that can be shared with other farmers. "We should thank NABARD and others for stimulating us to try SRI. But still there is not broad enough understanding of what is involved."

Now other suggestions were made. SPWD asked the state extension department whether it could recognize and support Community Resource Persons (CRPs) whom it (SPWD) had trained, enabling them to serve as 'farmers' friends,' to facilitate communication. Someone from BASIX commented that SRI needs some financing to 'lubricate' it. His NGO runs a 'self-financing' extension program where farmers get training and technical backup for SRI for a fixed fee (Rs. 500) per farmer per season (<http://sri.ciifad.cornell.edu/countries/india/orissa/InOrissaBASIXextension.pdf>). The calculated net return from one acre of SRI practice is 20 times this amount, so this is a cost-effective expenditure.

Anil Verma (PRADAN) described forums and mechanisms in Bihar State for coordination among a variety of stakeholders bringing together government and civil-society actors. Another NGO said that SRI should not be promoted until the government has provided new water bodies (reservoirs) which can ensure sufficient water and effective water control; while another objected to the types of weeders being disseminated now, pointing out how important it is that provision be made for weed control with SRI.

The discussion ranged rather widely. As the program ran increasingly behind schedule, a panel planned for farmer experience and grassroots organizations' comments did not occur. It was planned that the seminar would wind up by 4 o'clock, recognizing that Marguerite and I were had reservations on a 6:30 flight to Kolkata. The program closed about 4 with a 'sense of the meeting' conclusion that SRI dissemination should be expanded and accelerated in Jharkhand state, and with the customary 'vote of

thanks' extended to all who had spoken, all who attended, and all who had made the workshop possible.

There was a slow disbanding of the seminar, with multiple leave-takings and much camaraderie. As it turned out, Marguerite and I had no need to hurry to leave because a typical North Indian winter fog had descended on Ranchi, and the evening flight to Kolkata was canceled, as was the next morning's flight as well. To travel onward to the symposium at Tamil Nadu Agricultural University, we ended up the next afternoon taking an overnight train directly to Bhubaneswar, not traveling via Kolkata, and from there we flew to Hyderabad and then Coimbatore.

That there were such limited connections by air out of Ranchi, only to Delhi or Kolkata, underscored the state's disadvantaged position. For many years it was a part of Bihar state that was underinvested in, because of its poverty and its concentration of ethnic minorities. There is, however, considerable institutional commitment now to redressing past neglect through government, NGO and private-sector action. There is an environment for cross-sectoral cooperation, and quite possibly the productivity opportunities that SRI is opening up – for achieving self-sufficiency in grains and for income improvement through production of vegetables and even lac – will strengthen the economic base that is so evidently needed to make Jharkhand's future more promising.