

Report on Visit to INDONESIA for Review of Current Status of the SYSTEM OF RICE INTENSIFICATION (SRI), September 8-15, 2005 – Norman Uphoff, CIIFAD

An International Rice Conference held in Denpasar, Bali, September 12-14, organized by the Indonesian Agency for Agricultural Research and Development (IAARD) and co-sponsored with the International Rice Research Institute (IRRI). From participating in this event and making a number of visits and contacts before and afterwards, it was possible to get a better idea of how SRI is progressing in Indonesia, the third largest rice producer (and consumer) in the world.

Indonesia was the second country outside of Madagascar to evaluate SRI methods and to confirm their value. IAARD's first trials at its Sukamandi rice research station in dry season 1999 gave a yield of 6.2 t/ha, good though not spectacular. Its next set of trials in the wet season 1999-2000 attracted more interest, as the yields were 7.2-9.3 t/ha. After more trials were conducted the next year in 8 provinces, IAARD incorporated SRI methods into a new strategy it was formulating to halt yield stagnation in its rice sector.

This strategy called Integrated Crop and Resource Management (ICM) included, in addition to SRI practices, an integrated pest management (IPM) component and use of the leaf-color chart that IRRI was promoting for more efficient use of nitrogen fertilizer. My previous visit to Indonesia had been in January, 2003, so I had a lot of catching up to do. Having visited this country several times a year during the 1990s, as coordinator for Cornell's side of a collaboration between CIIFAD and IAARD, I already knew many of the leaders in Indonesia's agricultural sector personally, which made the visit more productive and more enjoyable.

Summary Observations: Before going into specifics, here are conclusions from the visit:

- (1) There is now some potential for leadership on behalf of SRI at **high levels in the public sector and civil-society sector**. The new Deputy Minister of Agriculture and a former Minister of Agriculture now prominent in rice-sector NGO work (the Field Foundation and the Indonesia Rice Foundation) both expressing willingness to support more coordinated and concerted efforts.
- (2) **Alumni of the farmer field schools** (FFSs) that operated under Indonesia's national program for integrated pest management (IPM) represent a major resource for SRI dissemination. All together they number about 1 million rice farmers and are supported by the Field Foundation. The farmer science centers (KSPs) that the alumni participate in are now working with SRI as an extension of agroecological practice and are getting good results at least 80-90% of the time.
- (3) PU, the **government irrigation agency**, has begun systematic training of farmers on SRI as a water-saving methodology. For this year, PU allocated 1 billion rupiah (\$100,000) of its own funds for SRI training. Farmer results are building support for this effort, with one SRI farmer in Garut getting a yield of 17 t/ha, showing that the high results obtained with SRI methods in other countries are also possible in Indonesia. Usual SRI yields are in the 6-10 t/ha range.
- (4) There is now considerable experience and expertise for promotion of SRI within the **NGO community**, both in international NGOs operating in Indonesia like World Education and VECO and in indigenous NGOs from Eastern Indonesia such as I was able to interact with in Bali.

(5) One interesting area for systematic evaluation is the use of SRI methods with **indigenous rice varieties**. Balinese red rice, for example, is very popular and nutritious. Using SRI methods that can qualify as ‘organic’ for premium prices to grow these varieties, which deserve to be conserved in any case, could become something remunerative. PU in Bandung is already supporting production of ‘organic SRI’ though not yet necessarily with indigenous rice.

(6) There was not enough time during the visit to probe much on **problems and barriers**, but these seem to be more in the realm of perception and attitude than material or technical obstacles. One promising and needed area for experimentation will be the extrapolation of SRI concepts and practices to **upland or rainfed rice production**, as has been started in Philippines.

Agency for Agricultural Research and Development: A number of the key officials who are concerned with the rice sector were already in Bali for the international rice conference. So Dr. Effendi Pasandaran, a long-time colleague who has helpfully assisted our efforts in getting SRI started in Indonesia and who is now a senior advisor for agricultural research, could not arrange for me to meet many persons at the Ministry of Agriculture or IAARD during my first day in Jakarta, September 8. Some good contacts were made, however, during the pre-lunch, lunch, and after-lunch discussions that Pak Effendi arranged in his office in IAARD at Pasar Minggu.

Kai Chai Chong, team leader for the Participatory Development of Agricultural Technology project funded by the Asian Development Bank, has worked on Indonesian agricultural development for over 20 years in various consulting roles. He has followed SRI with interest in part because of its farmer participation dimensions. His project assists a dozen Centers for Assessment of Agricultural Technology (BPTPs) across Indonesia, from West Java to Irian Jaya. They are involved with demonstrating and promoting ICM, which includes SRI methods. His first question to me was: why is there still so little interest in SRI from donor agencies and many agricultural scientists, a good question for which I have no adequate answer.

Taco Bottema, director of the UN-supported Centre for the Alleviation of Poverty through Secondary Crops’ Development in Asia and the Pacific (CAPSA), based in Bogor, was also interested in an update on SRI, as was the Center’s program leader for research and development, Erna Lokollo. They see SRI as complementary and potentially supportive for developing secondary crops (*palawija*) in Indonesia. Taco said that he would sound out donors for support of SRI dissemination in a farming systems context. Given its added benefits for poverty reduction and environmental health, he considered SRI a ‘natural’ for donor support.

World Education: In the afternoon, I met Matt Zimmerman who is the country representative of this NGO which has been involved in SRI training since 2002. World Education (WE) has worked with a number of other NGOs such as LPTP and CRS to train staff who then train farmers. Unfortunately, the NGO that got off to the best start with SRI in Indonesia, ADRA, has pulled back from this part of its previous program. The seven farmers whom ADRA’s project manager in West Timor, Bruce Ewart, got to try SRI methods in 2002 averaged 11.7 t/ha, almost triple the 4.4. t/ha they got with their usual methods, which was already more than double the 2 t/ha average yield in that region. ADRA produced an excellent training video on SRI in 2003 that is now available worldwide from our web page. However, when ADRA’s program leadership in Indonesia changed in 2004, ‘agriculture’ was dropped from its country portfolio.

Matt reported that practically all of the feedback that WE has gotten on SRI has been positive, with higher yield, less water use, and improved incomes. Farmers are also finding that with SRI they can reduce their overall labor requirements for paddy rice. They are particularly pleased with the simple mechanical hand weeder (rotating hoe) that is recommended for use with SRI, finding that it makes their weed control faster and easier.

Matt is disappointed that WE has lost its funding for SRI work in Java. It has had to refocus efforts on conservation-oriented projects in Kalimantan. It is introducing SRI there with hunter-gatherer communities, but all progress in establishing alternatives to shifting cultivation is slow. There has been enough good results, however, to make him optimistic that SRI can help take some pressure off the rain forest areas that are home to wild populations of orangutan in Kalimantan. This is a use of SRI similar to that in Madagascar, where from 1994 to 2004 CIIFAD tried to protect endangered forest species under USAID-funded projects by extending SRI use in the regions around protected areas.

Field Trip to Ciamis: The integrated pest management (IPM) program that was started in Indonesia in the 1980s with FAO support has grown and evolved greatly over the past 20 years. Over 1 million farmers have gone through its farmer field schools (FFSs), which imparted knowledge and practices for IPM through participatory methods. FFS alumni are organized into farmer science centers (KSPs) that continue farmers' experimentation and farmer-to-farmer extension to improve smallholder agriculture, mostly in rice-based farming systems.

After 2001, when donor funding came to an end, efforts were made to carry on the IPM work independently of government agencies. An NGO called the Field Foundation was established to carry on the IPM/FFS work. There were still links and cooperation with government as a former Minister of Agriculture, Dr. Sjarifuddin Baharsjah, serves as chair of the foundation's board of directors. The Field Foundation receives support from the Asian Development Bank (ADB) and other agencies to maintain a national program of smallholder training and organization.

In 2001, a KSP in Ciamis, West Java, undertook evaluations of SRI on three farmers' fields with very positive results. (The report is available from the Indonesia country page under the SRI home page on the web.) Since then, SRI use has been spreading within the program. The Field Foundation's main focus is on training support for other NGOs and government agencies, and SRI is included within broad program to promote ecological agriculture.

At 7:30 on Friday morning, the second day of my visit, Engkus Kuswara and Tryanto PA (Try) from the Field Foundation picked me up at my hotel, and we went by taxi to the train station to begin a two-day field trip. Engkus was the IPM trainer working with the Ciamis KSP in 2001 who oversaw its initial evaluation of SRI. He has stayed involved with this innovation ever since, he said, because he "loved" SRI from the first time he saw it tried.

(Engkus confided to me that he had underreported the results of those first SRI trials in Ciamis. He reported the SRI yields as being between 7 and 9 t/ha, but actually they were 9 to 11 t/ha. He said he reduced them by 2 t/ha because he was afraid that otherwise nobody would believe him.)

When the train arrived in Bandung after a three-hour trip, we went straight to a training center of the Indonesian government's public works agency, known as PU, which is responsible for the irrigation sector. I was surprised but pleased to learn that PU has begun doing SRI training on an expanding scale, with the primary objective of saving irrigation water. The Bandung center has trained 3,000 farmers in SRI methods over the past two years, and 80 farmers were participating in a current five-day course on 'increasing water use efficiency through SRI.'

SRI Training Program: The director of the PU center, Sutarmin Kasnawi, greeted us and showed us around his center while we waited for an opportune time to join the training program's closing session. On Sutarmin's T-shirt was printed "*SRI Organik*" on front and back. He proudly showed us plastic bags of organically-grown SRI rice that are being sold in the market for a good price.

I told Sutarmin about our SEED initiative, which is working with farmers in Cambodia, Madagascar and Sri Lanka to grow and sell indigenous rice varieties. SRI need not be 'organic,' but it gives better results without use of agrochemicals, so the resulting rice can have more value in local and international markets. Our efforts are still mostly in the planning stages, however. It was good to see such an effort already started in Indonesia, although not yet with indigenous varieties. That can come.

I suggested that they analyze their SRI rice to determine nutritional content, thinking that SRI plants with larger root systems are likely to take up more micronutrients and thus to produce more nutritious grain. In this regard too Sutarmin was ahead of us. He showed me a nutritional analysis done on this rice: carbohydrates 69.05%, protein 6.32% (Kjeldahl test), fat 0.87%, water 12.69%, dust 1.53%, etc. and no pesticide residues.

The analysis that he showed me of 'normal' rice for comparison showed detectable residues of pesticides and zero levels for the micronutrients tested (zinc, copper, etc.). Neither analysis had assessed any vitamins, however, and the SRI analysis had not assessed trace levels of micronutrients. We would expect the latter to be higher in SRI grains, given their greater density and resistance to shattering during milling, but we have no evidence on this.

Sutarmin showed me some of the rice plant stumps (culm and roots) that are used in the course to show the difference in tillering and root growth between SRI methods and normal ones. One SRI stump he brought out had 86 tillers, and long, fine roots that I compared with women's hair. He also showed me plasticized pictures and diagrams that they use in their SRI displays and training, including some from articles and documents that they got off our SRI web page. Sutarmin proudly told me that one farmer in Garut district, West Java, Agung Darliat, has reached a yield of 17 t/ha with SRI methods, growing rice in rotation with soybeans.

We joined the course as it was concluding with formalities and prayers (this being Friday), and with the passing out of course-attendance certificates. Many farmers were already wearing blue T-shirts given out by PU with the name of the course emblazoned on the back. I was pleased to receive one from Sutarmin as a remembrance of my visit to his center.

Enseng Asikan, the first farmer to use SRI in Ciamis, was pointed out to me, sitting in the front row. He had been invited to serve as a resource person for the course. Engkus reminded me that Asikan had attended a talk I gave on SRI back in January 2003 at the rice research center at Sukamandi, showing how serious a farmer he is.

Although the course was formally over, participants remained for a short powerpoint presentation on SRI, in which I showed them pictures from the presentation that I had prepared for the Bali conference. There was much farmer interest in seeing results of SRI methods around the world: Cambodia, Sri Lanka, China, Cuba, India, Gambia, Guinea, Vietnam, etc.

I started with a picture of Ms. Im Sarim in Cambodia, standing in the middle of her paddy field holding up an SRI plant grown from a single seed. Its huge size evoked audible gasps and murmurs of admiration. My comments on the pictures emphasized the importance of encouraging 'the life in the soil' to get the best SRI results. Enough heads nodded that it was apparent that this subject had been addressed in the training course.

After half an hour of pictures and commentary, the session was closed. Farmers came up to shake hands before we all stood together for the customary pictures. Sutarmin and his staff reiterated their satisfaction with SRI and with their role in training. He said that PU has budgeted 1 billion rupiah (\$100,000) for SRI training this year. Such courses are also being run in PU training centers in Yogyakarta (Central Java) and NTB (Eastern Indonesia). That Sutarmin and his staff are also promoting organic SRI rice production and sales indicated that this is more than a 'job' for them. They value SRI's contribution to health and the environment as well as to farmers' income and to water-saving, which is PU's official concern.

Asikin accompanied us on the three-hour drive to Ciamis, as did Engkus' elderly father-in-law, Suhardjinata, who lives in Ciamis and grows SRI rice there. Last year, Suhardjinata got a yield of 10.2 t/ha from his 2 ha of SRI rice. He had been a resource person in the course and wore a baseball cap (designed by Try) with "It's About Community Empowerment" embroidered on the brim. The ambience was more like that of the Philippines than what I was used to in Indonesia.

On the drive, I talked with Asikin about his SRI experience. He has only 0.5 ha of paddy land, but is doing well by using SRI methods with a traditional variety. He transplants seedlings a 25x25 cm spacing when just 6-7 days old. He said he had thought that the plants would have the same number of tillers as when grown with regular methods (normally this variety has few tillers). "But I was wrong." With SRI methods, the plants have 30-50 tillers, compared with usually about 8 tillers when conventionally grown. The panicles have averaged about 300 grains, even up to 350. Moreover, the crop matures two weeks sooner, in 120 days rather than the usual 135 days. (Asikin was very proud of this and seemed a little disappointed when I said that we have documented a similar 15-day reduction in the crop cycle with SRI methods also in Nepal.)

His yield has been 7-9 t/ha with this traditional variety, which usually gives 3-4 t/ha at most. He mills the rice himself and sells it for 4,500 rupiah/kg, considerably more than the 2,000 rupiah for which most rice sells in the market. His milling outturn of 70% with SRI rice compared to a normal rate of 65% represents a 12% increase in milling rate. Asikin's account mirrored in practically all details what we have been seeing and reporting about SRI around the world.

Engkus estimated that at least 6,000 farmers are now using SRI methods in West Java. Because the promotion is quite decentralized, there are no complete statistics, however, and the number could be higher. He thought there are probably at least 10,000 farmers using SRI in Indonesia as a whole. But again, this number could also be higher. Many NGOs as well as some government agencies are promoting SRI, he said.

Paradoxically, the irrigation agency (PU) is promoting SRI more actively than is the Ministry of Agriculture. It was small consolation for Engkus to learn that this is seen also in the Philippines, Sri Lanka, and India. This current season the Department of Irrigation in Andhra Pradesh state of India is promoting SRI use on 100,000 ha in its major schemes, without help or encouragement from the Department of Agriculture.

The Field Foundation program has incorporated SRI into its ecological agriculture training programs, several funded by the ADB. It recently trained 200 farmers in SRI methods in Lampung, South Sumatra. In West Java, 20 FF staff are working full-time on SRI, and most of its 2,000 staff throughout Indonesia include some work on SRI in their programs. In West Java as a whole, counting the staff of other government agencies and NGOs, Engkus thought that probably 50 persons are now working full-time on SRI training and dissemination.

We agreed that while this is an impressive number, given the millions of farmers in this densely-populated province, more rapid diffusion will require farmer-to-farmer spread. In Cambodia, for example, a CEDAC evaluation of 120 SRI farmers who had used the methods for three years considered this process. It found that on average, each of these farmers had spread SRI to 16 other farmers either within or outside their home villages. Such a multiplier effect will need to be supported here, perhaps with simple demonstration materials that are tailored to support farmer-to-farmer dissemination.

Farmer Field Day: Saturday morning after a good night's sleep in Ciamis, we left at 7 a.m. to drive to Banjarsari 30 km south of Ciamis, to a field day hosted by the KSP Bumisejati in the village of Rutawangi, where Engkus' family lives.

En route, Engkus told me about Field Foundation staff in Central Sulawesi who have been introducing SRI through farmer field schools to both Muslim and Catholic farmers in Poso, where there has been communal strife for three years. Participants from both communities have been brought together in FFSs and are cooperating in the evaluation and spread of SRI. Field Foundation is working with two local human rights and has funding from a Canadian NGO, Alternatives for this work. Already within 2 years, SRI is being cultivated on 40 ha (100 acres) there, with much satisfaction.

When we reached Rutawagi about 8 o'clock, farmers from 5 subdistricts were already gathering under a large tent set up on an open field. To reach it from the main road, we had to walk across an abandoned railroad trestle to get to the field. All along the way banners had been put up by the KSP to welcome everyone to 'SRI.' Engkus commented as we walked on how fortuitous it is that SRI is also the name of the Indonesian 'angel of rice,' the goddess known as Dewi Sri.

Long tables with demonstrations and displays had been set up, with *Organik SRI* banners attached. Of particular interest to me were the collections of local varieties and the examples shown of participatory plant breeding, where farmers had crossed popular indigenous varieties to produce new varieties that have larger grains.

There were 10 small woven baskets with tiny seedlings sprouting from the mud in the bottom, ranging from 1 day to 10 days old. A small muddy patch had been prepared nearby for showing proper transplanting methods, and I was asked to start the demonstration. It was good to hear the farmers' coaching me: "Not too deep," "Be sure to put the root in horizontally," etc. -- advice that I have given by now hundreds of time myself, although I am sure that their skill with these methods is by now much greater than mine. After some amusement over my less dextrous technique, we had breakfast prepared by the host farmer organization.

When Engkus started the meeting, there were about 80 farmers and a few Field Foundation and government staff present. Different groups stood up in turn and introduced themselves.

- The first group of 10 farmers said that they have 40 members altogether, but not all could come for the meeting. They have 6.5 ha under SRI and get yields of 5-7 t/ha, with an average of 6 t/ha.
- A group from Lakbok all wearing group T-shirts said only 11 of their 32 members had been able to come. They have 15 ha under SRI and have yields of 4.2 to 8.4 t/ha, with an average of 5.6 t/ha.
- A third group, from Banjarsari subdistrict, with 5 women present, said that most of its 30 members are women. They are just starting and have only small trial plots, totaling 3 ha. Their average last season was 7 t/ha.
- Another KSP from Banjarsari, with 42 members, said that 15 of them are women. They have 10 ha under SRI, with yields averaging 7.5 t/ha, and a top yield of 10.4 t/ha. They would have done better if this were not a very dry season they said. Their yields with normal methods average 4.2 t/ha.
- Another group said that it has 3 ha under SRI, and they have reached as high as 12 t/ha, with an average of 9.5 t/ha. And so on.

Next, nine representatives of a regional IPM Farmers Association stood up together. Their organization has a total of 29,000 members, all alumni of FFS training. It supports member groups in trying out SRI and expanding its use. It was reported that one of their farmers here in Banjarsari had reached 15 t/ha. However, his field was only 0.41 ha, they added, so it is not 'large-scale.' This had showed them what is the potential with SRI.

Then, officials from the subdistrict agricultural extension office, from PU, and from the kecamatan (subdistrict) administration introduced themselves. Usually in rural meetings that I have attended in Indonesia, the officials all get introduced first, and then the farmers, so this was an interesting reversal. All expressed strong support for this SRI effort. The PU representative said (in English for my benefit), "In my mind, SRI can solve our problem of lack of water." He reminded everyone that since 2000, the subdistrict has been facing increasing water shortages.

I was then asked to speak. Since they already knew about SRI, I focused on some of the reasons why better results are achieved. Engkus encouraged me to address the complicated subject of

phyllochrons, drawing diagrams of tillering sequencing and explaining what is a Fibonacci series (this is set of numbers that describes how rice plants tiller if their growing conditions are good). Many careful notes were taken as Engkus translated my explanations.

I went over the factors that shorten rice phyllochrons (regular intervals of tiller production) so as to speed up plant growth: warmer temperatures, exposure to sunlight, wider spacing, penetrable soil, sufficient nutrients, sufficient oxygen, and sufficient water. Conversely, phyllochrons are shortened and plant growth is slowed, by: colder temperature, shading, crowding, soil compaction, and insufficient nutrients, oxygen and water.

All this appeared to be quite comprehensible to the farmers, who grow rice for a living. I also said that we hope SRI methods will raise the productivity of their land, labor, water and capital so much that they will be able to meet their rice needs with less of these resources -- and can deploy some of these to other, more diversified, more profitable and more nutritious production activities.

When questions were invited, one farmer said that he gets very good tillering, up to 96 tillers on one plant; but the percent of effective tillers (number of panicles formed) is only about 50%. This is lower than others usually get, and the farmer acknowledged when I asked him that he is still putting on a large amount of N fertilizer. This we suspect, from various observations, has a negative effect on panicle formation even though it promotes tillering. Systematic work still needs to be done on this.

The second question was how SRI could help to reduce global warming. I said that we have no evidence on this, but there is reason to believe that SRI can reduce methane production, which is a major greenhouse gas. However, when paddy soils are kept dry rather than flooded, this could increase nitrous oxide. We think that if farmers do not add synthetic N to their paddies, their production of nitrous oxide will be minimal. However, because this is a more harmful gas than methane, it should be studied carefully.

A third farmer said that he had good rice plant growth for the first few months and then this growth lagged. Why? I said that this had to be determined in the field, because each situation can be different. But from what we have seen elsewhere, my first suspicion would be possible problems with nematodes, when the soil is kept aerobic rather than anaerobic. Some soils harbor root-eating nematodes that become more numerous under unflooded conditions.

Then the question was asked: how many seasons of rice can be grown in a year with SRI? I said three should be possible with good weather conditions; but I myself would rather grow a really good single crop of SRI and then grow other crops in rotation, like potatoes or legumes. This can enhance the rice crop yield while giving more diversified income and nutrition.

We took a break, and I was asked to observe demonstrations set up with soils having different amounts of organic matter, to see how quickly (or slowly) air and water pass through them. Dishes, cups of water and balloons were used to show the greater permeability of soil with organic matter in it. Also, there was a demonstration using a light bulb connected to electrical current with two terminals that could be dipped into cups of different solutions. The solution

made from urea fertilizer hardly elicited a glow, while the light bulb lit up brightly in many different organic materials used to fertilize crops – solutions or decoctions of sugar cane, household waste, rice straw, animal blood, cow urine, rabbit feces, etc.

Since there was no analysis of the mineral contents of the solutions, it was not clear what scientific point was being made, apart from differences in electrical conductivity. But it was a dramatic demonstration, made more memorable by the pungent smells from some of the cups. The farmers filling the cups and dipping the terminals into them were very organized and serious. That they had gotten productive benefit from using these various organic materials was sufficient confirmation for them.

I was shown pictures of previous KSP activities, including some with Ryan Van Haden, a Cornell graduate student doing a M.S. in crop and soil sciences. He had spent most of a year here on a Fulbright fellowship doing field work on SRI. He is now back at Cornell writing up his results for his thesis. Engkus and farmers said that they had greatly enjoyed having Ryan living and working with them, and asked me to take back their best greetings.

When we reconvened, I was asked to comment. I congratulated the farmers on their displays, but felt obliged to comment that their soil demonstrations were not fully satisfactory in my view. These were using ‘dead soil’ which is very different from the living soil that they use for their production. The soil samples in the plastic bottles being infused with water or air had been dried out and pulverized so that few if any of the organisms that normally inhabit the soil were present. I discussed the kinds and numbers of microorganisms and other creatures that make soil living and productive.

In particular they were fascinated by my discussion of how protozoa ‘graze’ the bacteria living on plant roots, fed by the sugars, starches, amino acids and other substances exuded from the roots. Protozoa excrete right onto the roots the ‘excess’ N that they take in when ingesting the bacteria. I wished that I had some appropriate pictures to illustrate this. But FFS experience had prepared them for such a discussion.

After my comments, one woman farmer asked if they could sing a song that they had composed about SRI. About half of those present stood up and gathered together in an impromptu choir, with the women singing the most enthusiastically. (Most of the men just mouthed the words.) Engkus translated snatches of verse: “Let’s try to grow SRI... SRI can solve our problems with water... SRI can grow good rice... With SRI we can become prosperous...”

When staff from an NGO in Tasik Malaya with which Ryan van Haden worked arrived late, they were asked to make a short presentation. They described first their positive experience in using rabbit manure for composting. Their SRI yields have averaged 5.5 t/ha, reaching 13 t/ha on some plots. A staff member named Alex said that in Tasik Malaya, they have trained 5,400 farmers in SRI. This number I questioned Engkus about, but he said this is what was reported. They now have 380 ha of SRI rice in their area, with a 9.2 t/ha average and a highest yield of 14.7 t/ha.

At 12:30, the meeting adjourned for an hour, while lunch was served. Engkus drove me, Try and his father-in-law to his home nearby for a special lunch that his wife had prepared. When we

returned, the group reconvened for another hour of discussion, on subjects such as marketing and communication. I described how farmers in India, Cambodia and Poland have extrapolated SRI concepts to other crops – sugar cane, finger millet, winter wheat, and even chickens -- getting ‘more’ from ‘less’ through intensified management that capitalizes on biological interactions and processes.

One farmer wondered whether I was advising them to take up all these crops, but I said it was just to show them how SRI ideas and experience could be taken into new areas to improve their productivity and their lives. I passed out my business cards so that they could access our SRI home page on the internet and can communicate directly with me by email.

After several rounds of thanks and farewells, Engkus, Try and I excused ourselves for the drive back to Bandung. Engkus stayed at his home for the rest of the weekend, while Try and I reached the Bandung station just in time to catch a train back to Jakarta that got in at 10:30. This was a very encouraging day. FFS efforts have mobilized some impressive local talent and leadership. Further, they have created an ethos of initiative and cooperation at local levels that dramatically changed an earlier rural culture of acquiescence. I also learned more about activities of other NGOs involved with SRI as well as about the work of Field Foundation and its KSP affiliates around Indonesia. The mode of operation is more one of sharing than of competition, which is appropriate for SRI.

Trip to Bali: Our activities on behalf of SRI have been filled with many fortuitous occurrences, but few more serendipitous than the flight from Jakarta to Denpasar on Sunday afternoon. Entirely by chance, the seat across the aisle from me was assigned to Dr. Bayu Krisnamurthi, whom I have known for some years as a faculty member at IPB, Indonesia’s agricultural university at Bogor. For a while he served as deputy director of IPB’s Center for Development Studies, and when I visited Indonesia in January 2003, he organized a seminar at IPB where I presented what we knew about SRI at that time. With some pride he gave me his new business card, identifying himself as the Deputy Minister for Agriculture and Marine, having been appointed in May.

Time passed quickly as I updated Bayu about what we had learned about SRI since 2003. As a development economist, he had already become interested in the opportunities that SRI opens up. Now that he has responsibility for government direction and policy, he is more interested than before. As we landed at Denpasar, he asked me to write out ideas for how the various efforts currently underway in Indonesia could be expanded and coordinated with some help from the Ministry of Agriculture. It was also convenient that Bayu was met at the airport by a government driver, so we could ride together to the hotel, giving us almost another hour for discussion.

International Rice Conference: The welcoming dinner was already started when we arrived at the Meridien Hotel where the conference was being held. The first person whom I met at the dinner was Effendi Pasandaran, who had me ushered to a table where Dr. Achmad Fagi was seated. Pak Fagi organized the first seminar on SRI outside Madagascar, in October 1997, while he was director of the Central Research Institute on Food Crops in Bogor. He is currently a member of the IRRI Board of Trustees, having been previously director of the Indonesian Institute for Rice Research (IIRR) at Sukamandi and secretary-general of IAARD. Also seated

there were the IRRI representative in Indonesia, Dr. Shyam Mahanuddin, who attended the 1997 seminar at CRIFC, and Dr. Sumarno, another previous director at Sukamandi, who has been supportive of SRI evaluation. Soon Dr. Robert Zeigler, IRRI Director-General since March, and Dr. Keijiro Otsuka, chairman of the IRRI Board, also sat down at the table, quite distinguished and collegial dinner company. I talked also with Dr. Ren Wang, IRRI Deputy Director-General, who had hosted my visit to Los Banos six months earlier. The dinner was outdoors in mellow Bali weather, so the evening was as pleasant as imaginable.

Next morning at breakfast, Sumarno and I carried on our conversation from the night before about biological factors in rice production that are generally overlooked. We were joined by Dr. Ibrahim Manwan, former director-general of IAARD and a senior figure in Indonesian agriculture for the past 25 years. He also was interested in the ways in which SRI performance can be explained and encouraged holistic perspectives.

At the opening session of the conference, I sat with Pak Effendi and, again by chance, with Prof. E. A. Siddiq, former deputy director-general of the Indian Council for Agricultural Research (ICAR) and now a National ICAR Professor based in Hyderabad, as well as a member of the IRRI Board of Trustees. He had already been well informed about SRI by Dr. A. Satyanarayana, the main proponent of SRI in Andhra Pradesh.

The opening remarks by the Minister of Agriculture, Dr. Anton Apriyantono, after endorsing a combined commitment to the alleviation of poverty and modernization of agriculture called for ‘a new Green Revolution,’ an ‘evergreen revolution’ (borrowing Dr. M. S. Swaminathan’s term) that would combine environment-regarding traditional methods with modern ones. He suggested that as much as possible, it would be good to replace external inputs and manage pests naturally. I wondered how this was being received by the financial sponsors of the conference, which included BASF, Bayer, Syngenta, DuPont and other agrochemical companies. This sponsorship had suggested to me why SRI was not being featured prominently in the conference program; but the Minister’s remarks suggested why a place had been found in the program for a presentation on SRI.

Bob Zeigler in his keynote stressed that meeting the Millennium Development Goals, something still in doubt, would at best be just a start, because these targets would still leave 500 million persons in poverty. The objective of IRRI and all development agencies should be go “give farmers options.” He suggested that rice breeding “will remain the mainstay” of responses to rice sector needs, highlighting wide crosses and biofortification as promising avenues for research. But he also talked about the growing water crisis, requiring the rice sector to make do with less water, and the negative impacts of farm chemicals, creating soil and water pollution.

Zeigler noted that between 1993 and 2004, IRRI had reduced its own pesticide applications at Los Baños by 95%. Also, he spoke about IRRI’s work with the government and farmers in Vietnam to get substantial reductions in pesticide use there -- the so-called ‘three reductions, three gains’ campaign. This reduces seeding rate and applications of chemical fertilizer and pesticides, with farmers then getting higher yield, lower costs of production, and more net income. These results are all consistent with the strategy of SRI.

Before the session, I was able to talk with Dr. Mahabub Hussain, head of IRRI's social science department, who has been helpful in getting the Government of Bangladesh more interested in SRI. In his plenary presentation, he noted that worldwide growth in rice productivity has slowed down -- from 2.7% per annum between 1970 and 1990, to 1.1% per annum 1990-2004. With land and water availability diminishing, the rice sector faces acute needs to raise the productivity of these and other resources.

He spoke also of the need to maintain soil fertility and noted the overuse of harmful chemicals. Technological progress is "running out of steam" in the irrigated rice systems of Asia, he said. It has become very hard to increase average yields beyond 6 t/ha in China, Japan, Korea and Punjab (India), the areas where yields have been highest in Asia. With rice prices low and input prices increasing, it is hard to sustain profitability in the sector. All of the things that Mahabub pointed out justify greater interest in SRI by farmers, scientists and policy-makers..

Bayu Krisnamurthi in his plenary presentation presented the government's new strategy for 'revitalization' of agriculture, talking about the need to develop 'minimum-input' technologies that are more productive. He said the goal should be to get more production from less input, a central theme in SRI presentations. The previous government campaigns to raise production, such as Bimas, Insus and Super-Insus, he noted, were all input-intensive and are not good models now. He said that the government should be giving people choices and should emphasize environmental-friendliness. Bayu closed by saying that we need to "learn how to unlearn," to embrace new ideas and new approaches, also a good theme for SRI. "Knowledge of the past can be a constraint... the status quo is not an option." He thus set the conceptual stage very nicely for my presentation on SRI that afternoon.

After lunch, the leadoff presentation in the panel on Cultural Practices was by Jose Valmayor, a representative of Syngenta Asia/Pacific, who reported on experiences with its version of 'conservation agriculture.' Use of Gramoxone, a broad-spectrum, quick-acting herbicide, can accelerate land preparation by reducing the need for plowing, saving both water and labor. He reported that farmer are saving \$60/ha/crop from labor and water reductions in Sichuan province of China, with a 330 kg/ha increase in yield and an 8% improvement in net income, gains that hardly compare with those from SRI.

My SRI presentation which followed Valmayor's had to be quite condensed, to fit into 20 minutes. The session chair, Dr. Achmad Fagi, gave a friendly introduction, noting his long-standing interest in SRI. For those who were not at all acquainted with SRI, the pictures and data that I presented could have been overwhelming.

The third presentation was on ICM, the current Indonesian strategy for restoring growth to its rice sector. In introducing Dr. S. Abdulrachman from Sukamandi to make the ICM presentation, Dr. Fagi pointed out that ICM incorporates many elements of SRI. Abdulrachman said that their ICM strategy had been prompted by 'technology exhaustion,' specifically by declines in genetic potentials and by 'soil sickness.' (His powerpoint presentation was very similar to the Indonesian presentation to our SRI workshop at the World Rice Research Conference in Japan, in November last year). The results so far have been quite favorable, e.g., with an average 37% increase in rice yield and a greater increase in net returns.

When Abdelrachman was asked what is the relationship between SRI and ICM, he replied: “ICM was inspired by SRI.” However Dr. Fagi corrected him, saying that there were also other projects that influenced its formulation. My comment was that ICM, by focusing on the best use of inputs, rather than on the promotion of roots and soil biota, is still operating within the paradigm of the Green Revolution. This may have been too categorical a statement, however, because when I reviewed my notes, I recalled that Abdelrachman in his introduction characterized ICM as ‘the improved management of plants, soil, water and nutrients,’ echoing our conceptualization of SRI.

There were questions about experience with scaling up of SRI, dealing with weeds, the levels of organic matter input required, uptake of micronutrients, and greenhouse gas effects. There was little interest expressed in the use of Gramoxene. After a coffee break, the next paper, presented by Roland Buresh from IRRI, summarized lessons learned from ICM within the Asian region, starting with a contrast between SRI and ICM.

	SRI	ICM
Age of seedlings	8-12 days	15-20 days
Spacing	30x30 cm, up to 50x50 cm	20x20 cm or 25x25 cm
Transplanting	Square pattern	Square pattern or rows
Weeding	Mechanical weeder, no herbicides	Mechanical weeder or herbicides
Water supply	Intermittent irrigation	Intermittent irrigation
Fertilization	Organic matter	OM plus chemical fertilizers
Other practices		Seed treatment Mat nursery (for transport) IPM practices Post-harvest practices

Buresh said that ICM is “highly dynamic,” being continually updated with farmers; it is ‘not a package,’ he said, making ICM sound very much like SRI. (I pointed out to Roland afterwards that the SRI recommendation has always been to start with 25x25 cm spacing -- and then to adjust this upward or downward according to the fertility of the soil. As this can improve over time with SRI practices, eventually very wide spacing may give the best yield. The first author of the paper was Dr. V. Balasubramanian, Bala for short, from IRRI, who has persisted in overstating the SRI recommendation of ‘wider spacing,’ despite several corrections.)

By using young but not very young seedlings, ICM forgoes the yield benefits of transplanting before the 4th phyllochron. It is true that farmers are initially reluctant to deal with very small plants, but the KSPs have shown that Indonesian farmers can successfully work with seedlings only 8-12 days old. The main difference between SRI and ICM is the latter’s continuing use of chemical fertilizers and herbicides, although pesticides are reduced through IPM practices. All of the ‘other practices’ recommended are consistent with SRI, but they are not presented as part of SRI because they are others’ innovations. The ICM seeding rate of 10-20 kg/ha is 2-4 times SRI.

Many of the pictures used in this ICM presentation were from Tamil Nadu Agricultural University in India, and several had previously been used in Dr. T. M. Thiyagarajan's powerpoint paper on SRI given at the World Rice Research Conference in Japan in November.

Buresh's presentation stressed Thiyagarajan's findings that 'mechanical disturbance of the soil' with a cono-weeder or rotary hoe enhances rice plant root growth. However, he said that researchers have not been able to document any enhanced N uptake, even though crop yield was improved by such growth. (In Thiyagarajan's WRRRC paper, he showed soluble protein in SRI plants to be 34% higher than in conventionally-grown plants of the same variety, and nitrate reductase, the enzyme for reducing nitrate, to be 44% higher; so the measurement of 'N uptake' may not adequately capture what is happening with the plant's internal N supply.)

The ICM strategy seeks to optimize the efficiency of inorganic N applications, using a leaf color chart (LCC) that IRRI has developed, so as to get 1 t/ha more rice yield for just 40-55 kg of N fertilizer per hectare. ICM also does plant and soil analysis so as to replace the P and K removed by the crop. There is little consideration of biological processes or potentials in the soil to meet plant needs endogenously. Plants are to be managed to achieve "a healthy canopy," and water is to be managed to maintain "healthy redox potential" in the soil, concepts similar to SRI.

Organic manure is considered a desirable part of fertility maintenance and management, but Buresh enumerated only negative factors affecting farmer use of organic matter (availability, slow release, bulkiness, and affordability), not discussing any compensating advantages. Thus, my earlier characterization of the differences between SRI and ICM was pretty correct. The differences are more in terms of divergent thinking and emphasis than specific practices. These are mostly rather similar.

At breakfast the next morning I got acquainted with U Khin Soe, director for biotechnology in the Plant Genetic Resources and Plant Protection Division of Myanmar's Ministry of Agriculture and Irrigation. He was very interested in what I had said about SRI the day before and even more in our efforts to conserve rice biodiversity, which is his responsibility. He said Myanmar's rice gene bank has 8,000 accessions of indigenous varieties (Indonesia's has 1,200 accessions at present). With SRI methods, indigenous varieties usually produce much better, with yields in the 6-12 t/ha range. Although these are somewhat lower on average than SRI yields with hybrid or high-yielding varieties, the higher price that indigenous varieties command in the market make their production more profitable. Khin indicated interest in collaboration along these lines.

Tuesday's plenary session began with a presentation by K. L. Heong, IRRI's crop protection leader, who works on integrated pest management, on "Environmental Sustainability: A Vital Component of Asia's Rice Ecosystems." Heong gave more details on Vietnam's '3 reductions, 3 gains' program, where reductions in seed rate, fertilizer use and pesticides are giving 0.5-1.0 t/ha more yield, saving money, and helping the environment. His presentation provided much evidence for concern that the current high-input rice production systems are not sustainable and that SRI practices produce multiple benefits.

The presentation by Dr. Sjarifuddin Baharsjah, former Minister of Agriculture and now head of the Indonesia Rice Foundation, focused on the contributions that 'local wisdom' can make to rice

production and sustainability. He reviewed a number of indigenous institutions, starting with the *subak* system of water management in Bali, which have been effective over many generations in meeting people's needs while maintaining the integrity of local ecosystems. Far from being rigid, one hallmark of these institutions is their flexibility and their capacity for adjustment to change.

Effendi Pasandaran then gave a very good overview paper on 'perspective of rice production in Indonesia.' His conclusion was that "business as usual" will not suffice. He anticipated that although Indonesia is currently roughly self-sufficient in rice, it will again become a net rice importer, of as much as 4-5 million tons, if present trends continue. Both land and water need to be used more productively and efficiently. He also identified scope and need to improve upland rice production in Indonesia if food security and poverty problems are to be addressed.

After lunch the Cultural Practices section had an interesting paper on experience in Indonesia with the 'new plant type' (NPT) developed by IRRI. Based on modeling exercises, it was decided that the architecture of the rice plant needed to be changed by plant breeding, to have rice plants with fewer tillers (8-10) but all of them fertile with large panicles (200-250 grains). NPT plants could be planted quite densely and could be flooded and chemically fertilized to get 25% higher yield. Low tillering was bred into the NPT because previous evaluations of (continuously flooded) rice plants (with atrophied roots) showed 'diminishing returns' to tillering; the more tillers a plant had, the smaller were its panicles. SRI plants have showed the opposite, however, that with a large and functioning root system, rice plants with more tillers also have larger panicles in a positive-sum relation.

A. K. Makarim from the Indonesian Institute for Rice Research showed that NPT varieties in Indonesia performed very well in producing tillers and even large numbers of spikelets. But they are still out-produced by IR64, the current standard for comparison, 7.4 t/ha to 5.8 t/ha. Why? Grain filling is 82% in IR64, but only 59% in the NPT variety it was compared with. "NPT is good in sink, but poor in source," Makarim lamented. "The sink doesn't fill." Although N uptake rises initially, it is flat from 45-50 days onward. His recommendation was to improve grain filling through breeding.

When time for questions and comments came, I apologized that I was perhaps going to sound rude, but I was amazed that the whole discussion of NPT had neglected any mention of roots. The modeling that produced plans for breeding the NPT probably also neglected the fact that tillering and root formation are closely linked processes; plants with fewer tillers will have also fewer roots. It should be no surprise that NPT plants, with reduced root systems, are 'poor in source.' Makarim acknowledged that they were not considering roots or their contribution to yield and that this should become part of their research program on NPTs.

Dr. Wiratni from the Chemical Engineering Department at Gadjah Mada University gave a paper on optimization of biological nitrogen fixation (BNF) as a supplemental source of N for rice production in the presence of inorganic N fertilizers. It was good that the research proceeded from the recognition that applying inorganic N reduces BNF in the soil. The paper was based mostly on modeling, however, in the style of American university research. She looked only at cyanobacteria, which live under anaerobic conditions, and did not consider BNF by aerobic organisms as can occur in, on and around rice plant roots when soil is not continuously flooded.

The research identified a range of N fertilizer applications within which BNF by cyanobacteria could be sustained. However, this was mostly based on mathematical calculations, and it dealt only with one species. In fact, hundreds of species are involved in real soil systems, all competing for substrate material, so single-species calculations are unrealistic. Also, one questioner pointed out that the calculations had dealt only with the time dimension, and not with spatial factors. In the real-world, organisms clump together, and this affects their exposure to atmospheric N as well as to oxygen, and thus their capacity for BNF.

In the question period, I commended Dr. Wiratni for working on this subject, but observed that studying such a narrow range of organisms and variables, and then only by mathematical modeling, did not produce knowledge that could be much use for application. She, like Makarim, agreed with my comments, and later asked whether I could attend a symposium on these subjects that is being planned next year at her university.

Tuesday afternoon I had a chance to speak with Bob Zeigler, DG of IRRI. He had read the recent paper in *Field Crops Research* Andy McDonald et al. which ‘debunked’ SRI and thought it quite well-done as a piece of agronomic analysis. I told him that the data base they had used to reach their conclusion (that ‘best management practices’ give, on average, an 11% higher yield than SRI) was thoroughly flawed, not meeting the authors’ own stated criteria, and further that larger and better data sets from China and India supported in fact the opposite conclusion (that SRI gives higher yields than BMP, by 17-38%). Since I provided McDonald et al. with most of the data sets that they used, I know the details and limitations of these better than do McDonald et al. Bob said he would read the critique I had put together detailing deficiencies in the FCR article. I gave him also a copy of a BBC World Service report on SRI in Nepal.

NGO Experience with SRI: The conference concluded formally late Tuesday afternoon, with field trips on Wednesday. By happenstance, there was a workshop of Indonesian NGOs going on at the same time in Ubud, Bali. This was organized by UPWARD, a collaborative program on participatory development methods sponsored by the International Potato Center (CIP), and by VECO, a Belgian-based NGO with a strong low external-input sustainable agriculture (LEISA) program in Indonesia. I was invited to join the workshop and give a presentation on SRI since a number of the participating local NGOs had started to introduce SRI and I could learn from their experience. An hour-and-a-half taxi ride to the eastern side of Bali island got me to Ubud.

Dindo Campilan, coordinator for UPWARD, and I talked while participants were engaged in small group planning discussions. The workshop included 6 NGOs of 30 in eastern Indonesia that are part of a capacity-building exercise which UPWARD and VECO are supporting with funding from the Canadian IDRC. UPWARD is involved also in a wider program in South Asia that includes several of our SRI partners: the Green Foundation in Bangalore, India, and the International Centre for Integrated Mountain Development (ICIMOD) in Katmandu, Nepal. The Field Foundation is the Indonesian partner in this collaborative program of UPWARD/CIP.

After lunch, I made a presentation on SRI that elicited interest beyond those persons already working with SRI because sustainable agriculture is a cross-cutting concern of all the NGOs. When I finished and asked for question, Peni Agustiyanto, the VECO staff member most active

with SRI, said that their experiences with SRI have already showed it to be better than conventional methods. Their main concern now is how to scale up its use in eastern Indonesia, where much of the rice cultivation is rainfed.

We discussed the adaptations made by our NGO partner Broader Initiatives for Negros Development (BIND) in the Philippines. BIND's demonstration-trials have averaged over 7 t/ha yield with unirrigated production, using single plants, wide spacing, organic fertilization, etc. Mulching is the main innovation, equivalent to 'young seedlings.' Direct-seeding is definitely becoming an option, as transplanting is not necessary; only avoiding trauma to plant roots is.

Peni and others discussed the experience of NGOs in NTB, the western part of Indonesia's islands that lie east of Java. Mada Faku, Sambirio, YBC, LPMP, LPSM and YBD have worked with SRI for two seasons now. While usual yields average 4.2 t/ha, SRI has averaged 6.7 t/ha (this is in irrigated systems in different areas, not rainfed production). They have figured that with SRI, costs of production are reduced on average by 900,000 rupiahs/ha (\$90), using about 40% less water (though this was not measured).

Labor requirements are about the same, farmers say. Some areas report a reduction in pests and diseases, but others do not. In some places rats were said to be less, but elsewhere with more harvest they are more common. What are the main problems they face? Farmers' reluctance to take what they perceive to be risks with SRI: planting small seedlings and fewer seedlings, not keeping fields flooded. SRI is just getting started in the region. The NGOs working with it are small, local ones, close to the communities. That could be an advantage in getting wider acceptance. VECO will develop more training materials, in local languages, for further dissemination in eastern Indonesia.

Visit to First SRI Farmer on Bali: The next morning when checking my email, I got a message from Rajendra Uprety in Nepal, sending four pictures that he had taken from a visit to SRI plots the day before in Morang district. Two were of incredibly large SRI plants, one with 185 tillers! I forwarded the pictures to Ren Wang, IRRI deputy DG with whom I had spoken at breakfast and who had expressed desire to keep our lines of communication open. He emailed back that he would circulate the pictures within IRRI. The rest of the morning was spent working on this trip report.

After lunch, Mieke Leermakers, VECO country representative who is based in Denpasar, came by the hotel with Hira Jhamtani, who had works with the Sustainability Action Network and who had attended the conference. Together we drove into the interior of the island, to a small village Wangaya Gede located below the summit of Mt. Batukaru. There we met Dehan, who operates guest bungalows and a healthfood restaurant on the mountainside and is the first person to try SRI methods on Bali, according to Mieke.

Dehan's place is called Prana Dewi, named after the Indonesian goddess Dewi Sri who is the patron of rice growing. The farming operations that support the restaurant and bungalows are entirely organic. He tried SRI out on only a small plot last year, and used 20-day-old seedlings. But the growth was good enough that he wants to plant the rest of his rice land with SRI methods in the coming season.

I explained in terms of phyllochrons of growth why younger seedlings (<15 days) give better results, and he quickly grasped this. We discussed also how water should be managed so as to optimize both water and oxygen in the plants' root zone. Water supply is no problem on the mountainside, Dehan said, because of the many springs and brooks. To maintain sufficient aeration of the soil, Dehan described how he would put simple channels in the middle of the field and around the edges to drain water, just as Association Tefy Saina advises in Madagascar.

The previous day at the conference, I had met H. K. Tarjoto from the town of Jatiluwih which is only a short distance from Dehan's hotel. Tarjoto is growing and selling indigenous Balinese red rice, which is popular for its fragrance and taste. Dehan brought out some of his own red rice, hand milled, which is served as a specialty on the hotel menu. His rice is grown for own use, but Tarjoto is promoting his 'mountain-grown' red rice for a broader market. He is not advertising the rice as organic, however. Mieke said that there is heavy use of agrochemicals all over Bali, so that introduction of SRI here could be a service to environmental quality and health on this beautiful island.

On the two-hour drive back to the airport for my departure home, Mieke, Hira and I discussed how to get SRI more widely understood and used in Bali and in eastern Indonesia generally. VECO is strongly committed to both improving livelihoods and the environment, and it has good organizational capacities – and linkages – to assist NGOs in the region that want to support more ecologically-friendly agriculture. Poverty and food security are major problems throughout the region, and adaptations will need to be made for upland conditions. But we have now precedents for such adaptation.

Reflections: Indonesia was the second country outside of Madagascar where SRI was tried and validated, almost six years ago. But its spread has not been rapid. There have now been enough demonstrations of its merits within the country that both government and NGO channels of activity are now getting geared up to make a stronger push to bring its opportunities to Indonesian farmers. The network of KSPs established through the IPM farmer field school program, and now supported by the Field Foundation, is the greatest asset for any dissemination, but the training experience and capacity of Indonesia's public works agency (PU) is now also a resource that can be draw on.

The interest and support of the current Deputy Minister of Agriculture, Bayu Krisnamurthi, and the former Minister of Agriculture, Sjarifuddin Baharsjah, could be decisive in getting a more concerted and coordinated effort launched in the coming year. The expertise of NGOs like World Education and VECO can complement and enrich any public sector efforts, with the Field Foundation and the Indonesian Rice Foundation bridging between the public sector and civil society.

What I could not get a good feel for on this visit was the extent to which Indonesian farmers are taking ownership of SRI and making their own modifications and improvements as I have seen impressively on recent visits to India, Cambodia and Philippines. Photographic evidence from Nepal suggests that similar innovation and advancement is going on in that country, tapping soil biological potentials not seen with conventional modern agricultural methods.

There is still some resistance in agricultural science circles to accepting that SRI is ‘something new.’ It is contended by some skeptics that SRI is ‘just best management practices,’ whereas we think that the impact of SRI practices on root growth and soil biota create results qualitatively as well as quantitatively different, even though fully consistent with and explainable by what is known in the scientific literature. Maybe the 185-tiller plant from Morang District will help shift thinking from preoccupation with inputs and genes to get a focus on integrated plants, soil, water and nutrient management that promotes soil biology for the benefit of plants, people and the environment more generally.