

## TRIP REPORT FROM SRI VISIT TO THE PHILIPPINES, March 12-19, 2003

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After visiting China, among other things to participate in a national SRI workshop held at the China National Rice Research Institute in Hangzhou (separate report), I arrived in Manila late on the 11th. Next morning, I took the early flight to Bacalod, the provincial capital of Negros Occidental in the central Philippines. There I was met at the airport by Robert Gasparillo, who had attended the international SRI conference in Sanya, China, in April 2002. Robert took me to the office of BIND (Broader Initiatives for Negros Development), the NGO that he works for and which has been actively working with SRI in the region.

**Adapting SRI Concepts to Upland Rice:** The most impressive part of my visit was a discussion before breakfast with Robert and Benedicto (Boni) Sanchez, both program directors for BIND, and its executive director, Eva de la Merced. In the previous rainy season, BIND had applied SRI principles to rice production under rainfed conditions, using methods similar to those developed by colleagues in Madagascar to raise the yield of upland rice. This normally produces only about 1.5 t/ha in Negros.

A *traditional variety*, Azucena, was used because of its valued aromatic qualities. Five spacings were tried: 15x40 cm, 20x40 cm, 25x40 cm, 30x40 cm, and 35x40 cm. They planted 3-4 seeds per hill, instead of the usual 8-12 seeds, and then *thinned the hills* after 8-12 days, when the seedlings have just two leaves. Chicken manure was applied, aiming for a rate of 60 kg/ha of N based on soil analysis, and *a layer of mulch*, 5-10 cm thick, mostly *gliricidia sepium*, was applied.

Mulch was the main variation from usual SRI practice for irrigated production. (a) It *suppresses weeds* and makes weeding unnecessary. (b) It *conserves moisture* during the growing season, very important. (c) It *may add some nutrients*, particularly N, to the soil, though amounts were not analyzed. (d) Perhaps one of the most important things, it *lowers soil temperatures*, thereby favoring the growth of soil microorganisms and macrofauna. Farmers said that the increase in earthworm population under the mulch was very impressive.

BIND obtained truly remarkable yields from the 20 trial plots, each 200 square meters, covering 4,000 square meters in all. The average yields from four replications of each spacing were respectively, 7.0, 7.7, 7.4, 7.2, and 6.7 t/ha, with **an average yield of 7.2 tons/ha**. I think this is unprecedented for upland rice production. There was one application of seaweed-based foliar fertilizer during the season, which probably helped raise yield.

Robert provided detailed data on total and effective tillering and filled and unfilled spikelets for each plot. Tillers per hill (plant) ranged from 7.2 to 11.35 with the five treatments, with an average of 9.65, with 99.5% fertility. Panicle length averaged 30.4 cm, with an average of 345 grains per panicle, and a spikelet filling rate of 87.1%.

The labor and expenditure were more than usually invested in upland production, but the *economic rate of return* was remarkably high: respectively, 2.55, 2.89, 2.73, 2.63, and 2.42 pesos

per peso expended. This means that there was **an average return of 2.65 pesos per peso of cost**. Robert's report will be put up on the SRI home page ([www.ciifad.cornell.edu/sri/](http://www.ciifad.cornell.edu/sri/)).

BIND was following up the upland SRI experiments conducted in Madagascar in 1999 by Bruno Andrianaivo (FOFIFA) and Joeli Barison (CIIFAD) on a farmer's fields near Ranomafana. There they used mulching (but no pruning or foliar spray) and some chemical fertilizer with the compost (no strictly organic fertilization as in Negros). They got a yield of 4 t/ha, a huge improvement over the average upland yields around Ranomafana of 0.8-1.5 t/ha.

These results could open up a whole new chapter in SRI development, perhaps even more important for food security and poverty alleviation than SRI's contribution to lowland productivity, because upland households are some of the most needy in the world.

**Benefits for Women Farmers:** BIND also reported something on this, later confirmed with WomanHealth, an NGO working in the northern Philippines. At the Cambodian national SRI workshop held last January in Prey Veng, women farmers had been quite emphatic that SRI was preferable to conventional methods for women. They spoke of a reduction in women's labor, which our NGO partner CEDAC will gather data on. Possible health benefits should also be considered. WomanHealth says that women farmers working with SRI like it because its weeding methods reduce "women's infections," particularly urinary tract and vaginal infections, that arise from working in flooded fields. We have anticipated that schistosomiasis could be reduced by SRI water management methods. Possibly other health benefits can accrue as well.

**NIA Farmer Congress:** My visit to Negros Occidental was scheduled so that I could contribute to an annual Farmer Congress that provincial office of the National Irrigation Administration (NIA) was convening in Bago City on March 12, with some 500 farmer representatives coming from all over the province for prize-giving, speeches, etc. Robert first gave a report on BIND's work with SRI, showing that average yields of 7.2 t/ha were being attained for both lowland and upland rice cultivation. I then made a powerpoint presentation on SRI, which gave farmers more information on this methodology.

Before our group attended the congress, we visited a village, about two hours' drive from Bacalod, where farmers working with BIND had established SRI trials on a hillside overlooking the sugar cane-filled plains below. The plants were doing quite well, though they were not as robust as often seen with SRI methods. Farmers seemed reasonably impressed with the trials. What was most impressive to me was the dozens of "multi-purpose" trucks, owned by local governments all over the province, bringing hundreds of farmers up the sometimes difficult road to this village to observe the SRI plots before the congress opened.

**Provincial Council Endorsement:** BIND had been working with the Negros Oriental Provincial Council on a resolution to support a U.N. declaration of 2003 as International Year of Freshwater. The resolution tabled included a paragraph resolving that the provincial government would "promote watershed and water conservation programs like adoption of the System of Rice Intensification (SRI) that phenomenally increases rice productivity while using minimal freshwater resources, usually only two centimeters, way below the NIA benchmark of 10

centimeters to irrigated farmlands." Robert said he had suggested dropping the word "phenomenally" as possibly controversial, but others insisted that it is a correct wording.

After our lunch at the Farmer Congress, we went to the Council meeting at the Provincial offices. I was given half an hour to speak under a suspension of the rules. There was no LCD projector so my presentation was unillustrated, but I had pictures of SRI fields in China, given me by Z. B. Liu, a farm manager who has obtained a 16 t/ha yield certified by the Sichuan Department of Agriculture, to pass around. I am sure that the resolution would have passed unanimously even without a briefing on SRI, but BIND wanted Council members to know in some detail about the system and to be able and willing to talk about it with constituents.

**Year of Freshwater Forum:** Later that afternoon, BIND convened a forum at a local hotel with about 40 participants from NGOs, government bodies and universities, to mark the official closing in Negros of the observance of 2002 as the "UN Year of Mountains" and to officially inaugurate 2003 as the "UN Year of Freshwater." BIND and other groups in Negros had been very active during 2002 in highlighting the degradation of mountain forests, soils and water cycles in the region. They engaged in some dramatic efforts to publicize illegal logging. While this has not been stopped, it has been somewhat inhibited, and government bodies now feel pressure to take initiative in enforcement.

The president of the Provincial Council came to the Forum, bringing a copy of the resolution his Council approved a few hours earlier. He stayed for the whole event after giving a requested "inspirational" talk. After Boni Sanchez from BIND gave a powerpoint summary of "Year of Mountains" accomplishments, I made a presentation on SRI, having more time to go into technical issues than I could at the Farmers' Congress. There was a lot of interest, and questions continued for almost another hour. With BIND spearheading efforts and working with a combination of NGOs, people's organizations and government agencies, plus with good results, SRI should start to spread fairly quickly in this part of the Philippines.

**Field Visit:** The next morning after breakfast I traveled with a group of NIA officials and Institutional Development Officers (IDOs), staff who assist farmer irrigation associations, to see some of NIA's work with farmers. We got to the first village about 11:30 and met with community members participating in a Farmer Field School (FFS) supported by NIA, experimenting with vegetable production to complement the monocropped rice and sugar production in the area. They proudly showed me their demonstration plots.

We then went to a second village to meet its FFS members. They are growing vegetables on soil cultivated for decades with sugar cane, and their results were underwhelming, despite the evident effort put into laying out and planting their field. The soil is acid and very red. Farmers asked for suggestions on what they could do to improve their situation. I said that while I am not an agronomist, it appeared that their soil is deficient in microorganisms after years of monoculture.

I suggested that they try mulching the field because their meticulous planting and weeding left the soil completely exposed to the sun. (I referred to the field as "naked.") When the soil heats up during the day, it cannot support earthworms and the microbial life that could make it more fertile. They understood this point and said they would start mulching the next day. We then

drove to a third village where farmers from the first two villages gathered with members of the third FFS to hear a presentation on SRI after they served everyone a very good lunch.

As there was no electricity for a powerpoint presentation, the IDOs had made some pictures from my CD-ROM to pass around and had written out some large posters in Tagalog to summarize the main features of SRI. The group, about two-thirds women, was one of the most attentive audiences I have had for SRI, and many good questions were asked.

Since many grow upland rice instead of lowland rice, BIND's information on upland methods will be very valuable to complement what I said about lowland SRI production. After a four-hour trip back to Bacalod, my NIA hosts laid on a nice seafood dinner at a simple open-air restaurant, near where my BIND hosts had taken me the night before.

**IRRI Visit:** The next morning I took an early flight back to Manila, arriving about 9, where an IRRI driver met me to travel to Los Baños. Dr. Shaobing Peng greeted me on arrival, as did Dr. V. (Bala) Balasubramanian, and they accompanied me on a tour of IRRI's field station, led by Dr. Joe Rickman, the station manager. I learned that IRRI is in its third year of on-station trials with SRI methods, but its results thus far have been pretty disappointing.

The first season, the IRRI plot with SRI methods yielded only 1.44 t/ha. The SRI tillers/plant were the highest, 31, compared to an average of 7 for the other methods, and grains/panicle were 93 vs. 67 to 80, with effective tillering of 94%. But the tillers and panicles/m<sup>2</sup> were not enough to give a decent yield. Also, IRRI's labor costs for SRI were terribly high, 2.7 times those for the other methods, though there were some offsetting savings, with only 11% as much seed used, and 27% less water. With such results, one can understand why IRRI has not been interested in SRI. Fortunately or unfortunately, the IRRI results are atypical for SRI, even aberrant. (Farmers in Madagascar need about 50% more labor for SRI at first, but this comes down to only 25% more, or even no more, when they have learned the techniques; in some other countries, farmers are reporting little or no differential. in labor requirements)

The next season, SRI was included as one of six management systems to be evaluated both agronomically and economically over a six-year period. The other systems are: puddled and transplanted rice; puddled and broadcast rice; rice on dry-prepared land, dry machine-planted; rice on dry-formed beds, broadcast-seeded; and zero-till rice, dry machine-seeded. The SRI results were better than the first year, 3 t/ha, but still they were nothing like we see elsewhere. This time, water use with SRI was 57% less, and labor requirements only 1.14 times higher than the average for the other methods, which had an average yield of only 3.4 t/ha.

An interesting aspect of these trials was that a strip of all the trial plots was left unweeded, to see what would happen to yield when no weeding was done. The SRI plots had only a 20% yield decline, whereas zero-till and dry seeding yields were reduced by about half; broadcast yield went down by one-third, and the bed-planted crop yield was reduced by two-thirds. For some reason, not evident, the transplanted crop gave a 10% higher yield on the unweeded portion of its plots. SRI's robustness to weed interference is something Joe would like to understand better.

This season's SRI plots looked pretty pitiful, with the only consolation being that none of the other five sets of trials looked a lot better. Why are the SRI plots doing so poorly? Last year there was nitrogen deficiency at panicle initiation, Joe said, something that we rarely see in other locations. My own hypothesis is that the monocropping of IRRI station soils for years on end, with fairly high applications of both chemical fertilizer and various agrochemicals, may have altered and reduced soil microbial populations severely. We think that SRI results, particularly the very good ones, are highly dependent on the contributions of bacterial, fungal and other microbial activity. As far as I could tell, there is little work going on there on soil microbiology.

Shaobing and Bala are also puzzled by the poor showing of SRI methods on the IRRI plots. At lunch, we discussed some possible explanations. The Philippine Department of Agriculture's Agricultural Training Institute (ATI) has reported obtaining 12 t/ha average yields with SRI at its Cotobato center on Mindanao. Moreover, the value of its production with SRI was almost four times the cost of production, 96,000 pesos/ha vs. 25,000 pesos/ha. So the question is why IRRI's yields are so much lower than those of ATI; not whether SRI can produce higher yields. Bala and Shaobing that none of the IRRI trials is doing very well, none over 4 t/ha yield. Both asked Joe if they could each have a plot of their own to manage next season, to see whether they can't do better with their own preferred methods. Bala said that he would use some version of SRI.

After lunch, I met with Dr. Tanguy Lafarge, recently arrived from CIRAD. He works on tillering and is very acquainted with the concept and analysis of phyllochrons, having worked with them previously in his study of sorghum. We had an excellent discussion and should have fruitful ongoing communications. He said the explanation for SRI performance that I sketched for him based on phyllochron analysis made sense according to what he knows about rice physiology.

My conversation with Dr. John Sheehy ranged widely. He gave me a very interesting article of his (with several colleagues) on spikelet numbers, sink size and potential yield in rice, published in Field Crops Research (2001). He and his colleagues did an incredible amount of work to keep track of rice plant tillers in the order that they appeared so that they could assess the ultimate productivity of early vs. late-emerging tillers.

The analysis in the article showed the number of juvenile spikelets per panicle declining according to the temporal sequence of the tillers. Tillers appearing in the 80th day had about one-third fewer spikelets than those appearing 10 days after transplanting. The research also showed that tillers keep emerging on very widely spaced plants (1 plant/m<sup>2</sup>) up to the 80th day, while plants spaced 25/m<sup>2</sup> stop their tillering after about 55 days.

The research did not gather any data on plant roots, however, so it could be that the dropoff in fecundity is attributable to a decline in root capacity and function during the growing season, as rice roots degenerate under continuous submergence. This alternative hypothesis cannot be evaluated because the study generated no data on roots. Instead, Sheehy and colleagues attributed diminishing spikelet formation entirely to above-ground relationships, mainly an association with leaf area index (LAI).

I also met briefly with Dr. S. S. Virmani, the IRRI staff member most involved in hybrid rice development and dissemination. We met previously at the China National Hybrid Rice Center in

Changsha. Its director, Prof. Yuan Longping, satisfied him on the merits of SRI in general, though like other IRRI staff, he has a hard time accepting all reported results. He is interested in SRI because it reduces seed requirements by as much as 90%. One of the main obstacles to hybrid seed adoption is the high cost of seed, which many farmers find prohibitive and which SRI methods could greatly reduce. Prof. Yuan's trials have showed that SRI methods can top up hybrid yields by a ton or two per hectare. Combining SRI and hybrids is mutually advantageous (though in the Philippines, a number of the groups supporting SRI are at the same time opposing the promotion of hybrid varieties, which can create some potential awkwardness for us).

There was a good turnout for my seminar in Umali Auditorium, which discussed SRI in terms of a different "paradigm" for rice production. I laid out what I think are plausible explanations not just for the higher yields, but for the anomalous increases in yield under poor soil conditions. Most seemed very interested or at least curious about the possibilities that SRI opens up.

My presentation, however, really upset Dr. Sheehy, who attacked it as utterly unscientific, comparing it with astrology. He left when the chair suggested that the two of us have dinner together to sort out our differences of opinion, so there was no chance to respond to his disparagement. Fortunately, most others took a more positive view of SRI, or at least a more gracious one.

Unfortunately, since most staff had to leave by 5 o'clock, it being Friday afternoon, there was no opportunity for extended discussion after the presentation. Shaobing Peng corrected one of my slides, for which I apologized. I cited an article by Ying et al. in Field Crops Research (1998), to which he had contributed, quoting their statement that there is a strong *negative* correlation between panicle number and panicle size. Shaobing clarified that the authors were stating that this is what the rice science literature asserts (which was my point), but that this was not the authors' viewpoint. Their article supported the opposite position, which is what I have been saying based on our SRI experience, that the relationship can be positive.

Shaobing had attended my 1999 seminar on SRI at IRRI and spent some time with me then discussing it; he also attended the international SRI conference at Sanya last year. He said he hoped that I could see that the attitude toward SRI is now more favorable at IRRI. There was indeed more interest in considering what can be learned from SRI experience. SRI is not yet sufficiently documented and explained to the satisfaction of most scientists (or to our own). But progress is being made on the scientific front, parallel to the progress being made in practice.

Saturday morning I came back to Manila, where I met Robert (Obet) Verzola, who had taken the responsibility for setting up my schedule in the Philippines. He works with the Philippine Greens and the farmers' associations Pakisama, being very dedicated to the furtherance of ecological agriculture. He videotaped my presentation at IRRI (and several other presentations) to make a video for wider use in the Philippines. Sunday evening, Obet and I travelled three hours north from Manila to Nueva Ecija, spending the night in the guest house of the Philippine Rice Research Institute, known as PhilRice.

**"Nothing Surprising Except the Results":** After a good night's sleep and breakfast, Aurora Corales, a PhilRice staff member working with NGOs on behalf of the institute, came to brief us

on the day's schedule. The program started with a video introducing the work of PhilRice, which gave as much attention to PhilRice's outreach activities and its collaboration with NGOs and people's organizations as to its research activities. PhilRice's deputy director, Ed Redoña, welcomed us on behalf of the director, Leo Sebastien, who had traveled to India the day before.

I asked about how many PhilRice scientists are working on soil microbiology, one of our major concerns with SRI, and was told that there are two. One is Rizal Corales, Aurora's husband, a senior science research specialist working on the production and use of organic fertilizers and on rice-based integrated farming systems. We visited his model farm on the PhilRice grounds and saw the fermentation processes used to produce high-quality compost and the process for recycling wastes. That morning as I took my morning walk around the station, I had noted that there were various plots evaluating the effects of EM (Effective Microorganisms) as well as different organic fertilizers, so PhilRice is going beyond conventional fertilization strategies. The station itself is one of the most impressively laid out and maintained that I have visited.

The first SRI plot we visited that morning (labelled "Madagascar") was not very impressive. It was better than IRRI's SRI plots, but still not likely to yield more than 4 t/ha. We then saw some plots managed by Benito Gamiao, comparing a number of different practices. The SRI plot was not better than others, but he was impressed that single SRI seedlings were performing as well as 3 seedlings/hill in the adjacent plots, and since the input costs with SRI methods are much reduced, the SRI plants will be more cost-effective than the neighboring ones.

We then got into a bus for site visits to field activities of NGO partners: the Philippine Rural Reconstruction Movement (PRRM), Outreach Philippines Inc. (OPI, an affiliate of Outreach International), and the Social Action Center of the Catholic Diocese of San Jose de Nueva Ecija, called Gratia Plena (Full of Grace). The PRRM community-based project on carbonized rice hull production, which has started exporting to Japan, looked very well-run, but its economics are unclear, since the hulls it uses are transported free by the local government. Until there is build-up of local demand, it is not clear how sustainable this operation will be.

The Gratia Plena center was very impressive, a real beehive of activity. The facilities were not fancy, but a lot of work was going on. Its staff are developing, experimenting with and selling a variety of organic fertilizers and soil inoculants, multiplying microorganisms collected from forest environments and bottling them for application to fields. Ross Quin, vice president and operations manager of the center, explained that they are not trying to provide all the microorganisms that the soil needs but rather to identify and provide certain organisms that if added to existing soil communities will make these more vigorous and able to support plant growth.

GP has been using SRI techniques for four years, having learned about them from a visit to the Philippines in 1998 by Edmund R. from Association Tefy Saina and then learning more from Patrick Vallois of IPNR, also from Madagascar, who came to see their microorganism work. The SRI fields that Ross showed me looked good, but they were not as good as the best performance that Gratia Plena has gotten with SRI methods, up to 8-9 t/ha in the dry season.

After lunch back at PhilRice headquarters, we had a good turnout for my talk on SRI. The powerpoint presentation went over what we have observed with SRI methods and why we think they work, essentially the same presentation as at IRRI. I prefaced this talk with a new slide: *WARNING: Some of the figures and pictures you are about to see may be shocking. Professional discretion is advised.* This touch of levity was accepted with amusement.

After the presentation, Dr. Tito Cañare from the agronomy department at (neighboring) Central Luzon State University was the first to speak. He started by saying that nothing I had said was surprising, "except the results." (In my introduction I had noted that one scientist at IRRI had totally rejected my whole presentation as unscientific and "astrology.") Tito elaborated, saying that most of what I had presented in my talk is what he himself teaches his students. He said that he wished he could have brought his students to the presentation, because it offered some data that make such an understanding of agronomic relationships more comprehensible. However, Dr. Cañare, a sustainable agriculture proponent, may be in the minority among CLSU faculty.

Several others raised legitimate concerns about the sustainability of SRI given its high rates of offtake of nutrients. This is an empirical question, whether soil microbiological processes can in the long run sustain such high yield levels. So far in Madagascar, farmers who use compost usually find their SRI yields going up rather than down, despite high production and reliance only on organic inputs. SRI is not necessarily "organic." If soil amendments, e.g., P, become necessary down the road, we expect that farmers will use them, being better able to afford them and also understand their function thanks to using SRI.

Benito Gamiao reported on the results of his SRI trials on-station. The wet-season yield was 3.6 t/ha, about 20% less than the best comparable yield within the set of trials, 4.5 t/ha. However, the SRI yield was attained at considerably lower cost. The dry-season SRI plot had produced 8 t/ha, the same as the 'site-specific nutrient management' plot, again, with much lower costs of production. So he was satisfied that the system has merit.

The reception in general was very positive, though I was disappointed that there was not a larger attendance from PhilRice researchers who are not already involved with SRI evaluation or with agroecological approaches. With NGO and university colleagues taking an active interest and collaborating with PhilRice, there is a good basis for further progress on SRI. Robert called my attention to an article on SRI in the July-September 2002 issue of PhilRice Newsletter. It gave a very positive account, though it concluded rather lamely that "Results of the SRI technology showed that a yield of 3-5 t/ha can be attained." This is a yield more likely to be attained on experiment stations than on farmers' fields.

**University of the Philippines at Los Baños:** Obet and I drove back to Manila Monday evening, and a meeting that Obet tried to arrange for Tuesday morning with the chairman of the Senate's Agriculture Committee did not materialize. In the afternoon we drove back to Los Baños with Marc, a staff member of SEA-Rice, a Southeast Asian NGO trying to preserve indigenous rice varieties, and two farmers from the southern Philippines who were in town.

There was a good turnout of students and a number of faculty for an afternoon seminar on SRI hosted by Oscar Zamora and Pamela Fernandez of the College of Agriculture agronomy

department. Several students are doing thesis research on SRI, so we had some technical discussions. One plant breeding faculty member asked how long I had been promoting SRI. I explained that I was promoting the evaluation of SRI rather than SRI itself, because SRI always needs to be assessed for its suitability under local conditions. He seemed relieved when I said that I had withheld judgment on SRI for the first three years that I knew about SRI, not discussing it outside of Cornell because I was concerned that Cornell's name should not be identified with anything that could turn out to be wrong or a hoax. Only when the farmers with whom we worked in Madagascar, who usually got about 2 t/ha, had averaged 8 t/ha using SRI methods for three years, and we had evidence from other evaluations showing similar yield increases in that country, did I start trying to get others outside Madagascar to try it.

I don't know how many faculty besides Oscar and Pam will now take an active interest in SRI, but there will be a cohort of students coming through the agronomy department who do scientific research, and a number of them come from other Asian countries. Students from Indonesia, Nepal and Myanmar who attended the lecture already knew about SRI. A small group discussion continued until 7:30, nourished by the Los Baños specialty, buko (coconut cream) pie.

**NIA:** Wednesday morning, a NIA car took me to its headquarters not far from the hotel. A morning workshop had been planned for reporting on the progress of several donor-funded irrigation projects that NIA is implementing. Roger Lazaro, a consultant to NIA who attended a workshop in Thailand last April where I made a presentation on SRI and who has been trying since then to get NIA evaluating SRI particularly for its water-saving potentials, scheduled my presentation on SRI as the capstone of the event. There was considerable interest, especially among staff who work with farmer associations, so I expect there will be considerable experimentation with SRI starting with the next season.

**NGO Symposium:** The highlight of the visit to the Philippines was a five-hour farmers' symposium hosted Wednesday afternoon by the Philippine Movement for Rural Reconstruction (PRRM) and cosponsored with the Philippine Greens. There were about 35 participants, probably half of whom had personal experience with SRI. The others were NGO representatives. After I presented an overview of SRI, emphasizing the importance of promoting root growth and abundant and diverse microbial populations in the soil, there were several hours of discussion and sharing of experience.

José Riga from Cotabato in the southern Philippines has worked with SRI for three seasons, and he called it a "breakthrough" in rice production. He has gotten yields up to 11 t/ha, with an average of 7.2 t/ha. In 2000-2001, he said that El Niño had caused serious water shortage during the reproductive stage, but he still got a 3.8 t/ha yield, when others got little or nothing. His calculated net benefit-to-cost ratio that season was 2.2 pesos per peso expended.

Joe had had a nutritional analysis done of his SRI rice by the Food and Nutrition Research Institute of the Department of Science and Technology. He showed me the certified report, dated November 29, 2002, and let me copy down the data to take back to Cornell, for our nutrition faculty to assess how much of an improvement in nutritional content can be attributed to SRI methods. [They did not find the values reported to be higher than usual with rice, so these data did not show any nutritional advantage from SRI methods.]

For some time, we have surmised that SRI rice, resulting from more vigorous plant growth from soil microbiological changes, could have more nutritional value. But this question has not been investigated. Research reported at the China workshop in early March showed SRI rice to be "less chalky," an aesthetic rather than nutritional advantage. The nutrient content of rice can vary from field to field even with the same cultural methods, so this is not an easy matter to pin down. PRRM's vice-president, Isagani (Gani) Serrano told me that Joe is teasingly (affectionately) known in sustainable agriculture circles as 'the mad professor' because he pursues new ideas and innovations so actively and enthusiastically. The world could benefit from more of this kind of 'madness.'

Joe said that he adds natural micronutrients to reduce plant stress, using also a liquified fish abstract to increase N and burned coconut husk to provide more K; burning husks three times raises the K content to 40%, he said. He also adds P from organic sources. He had an average of 36 productive tillers with no lodging and was able to minimize water use. The rice had a very nice aroma, he said. The panicles were all well-filled, and his SRI plants were resistant to pests and disease. He now has the endorsement of the regional director of agriculture. He reported the planting of 383 acres in Cabacan and said there would be 1,500 acres in the wet season.

Participant Roland Sianghio, who said he was not a rice farmer but produces soil improvement materials, said that coconut dust is a very fine soil amendment to improve soil texture and water-retaining qualities. He puts 20% coconut dust in the organic fertilizer he makes from municipal waste.

Joe said that there can be a problem with using young plants because the golden snail (bohol) loves to eat tender leaves. Roland responded that snails should not be a problem. His solution? Eat them. If you collect them and wash them three times, he said, they are nutritious and delicious for humans to eat. There are nice recipes, he added. Otherwise, snails can be collected and crushed to feed to pigs, chickens or fish (tilapia or catfish). Someone objected that this could not be done on 10,000 hectares. This is a common argument against SRI methods, that they cannot be used on a very large scale. But Roland did not accept this. He said that hiring one person per hectare to collect snails or their eggs before they multiply is quite feasible and cost-effective. He noted that the Japanese snails, once a major pest, are now being grown as a backyard food crop and sold for 8-10 pesos/can.

Bernie Aragoza, a pony-tailed organic farmer from Cavité who attended my seminar on SRI at PRRM the previous April and has used SRI for several years, said that manipulating water levels can control the snail until the plants are large enough to withstand attack. He said that in his experience, snails can be managed. I related the report I had heard in Negros of a farmer whose crop of SRI seedlings had been eaten down to the ground by snails, yet the plants had regenerated from the intact roots in well prepared soil and had given a normal yield. I told also of two farmers in Madagascar who had had their SRI plots completely eaten by locusts, and yet the plants recovered fully. So the golden snail need not be an insuperable problem with SRI. Farmers should be able to devise suitable and effective strategies to cope with this hazard.

Bernie said that SRI is not a simple technology. It requires testing and evaluation. Most farmers in Cavité are used to doing chemical farming. "It is hard to change habits, like smoking." When he first introduced SRI there, 200 farmers came to a presentation but only 8 joined the group to work with SRI. "Until farmers see impressive results, they won't take something new seriously." The group was given a hectare of land by the governor of the province to demonstrate SRI. They have averaged 5.5 t/ha, with a top yield of 7.5 t/ha.

They are not doing "pure" SRI, however, Bernie added, since some are using chemical fertilizers. And they plant 2-3 seedlings together, out of fear for the snails. Farmers in his area usually plant 5-10 seedlings in a clump, so this is quite a change, and expanding spacing from the usual spacing of 17x17cm to 25x25 or even 30x30 cm is also a big change. Only one of the eight used chemical pesticides, and he was the one who had a problem with tungro. (The implication was that the chemical use caused this problem, because the others were spared.)

Bernie spoke very strongly in favor of using the IR-74 variety with SRI. He gets up to 50 tillers per plant with this variety. It doesn't have as good an aroma, he said, but the taste is okay, and it grows very robustly. He checked root growth at 20 days and found the SRI roots were really much longer compared to the roots in surrounding rice fields. His group had difficulty finding rotating weeders because these are not made locally any more, given the widespread use of herbicides. His summary evaluation of SRI was: "I think SRI is good, but because farmers are used to chemical farming, it is not easy to spread this method." Chemical farming is "the work of lazy people," he added. "Unfortunately, our culture now favors that system."

On a more encouraging note, Bernie said, "When farmers saw that the results of our SRI, they became interested." The farmer who had had the tungro attack still got 4.5 t/ha, when because the attack came at the flowering stage, he had not expected to get anything. Bernie expects 50 hectares to be planted to SRI this season in his area. "More and more farmers prefer just to get a job off farm, and rice production is becoming a sideline." He predicted that SRI would become more popular in more remote areas, farther from urban areas than his area of Cavité.

Next, someone from the PRRM program in Nueva Ecija spoke. His program works with 700 farmers in 23 communities on sustainable agriculture. Now they are getting involved with SRI and have two demo farms, one rainfed and one irrigated. He introduced six farmers who had come with him to the symposium. He then expressed "mixed emotions" about SRI, echoing Bernie: "It is very difficult to change practices, it is like talking to a deaf person."

PRRM in Nueva Ecija works with PhilRice on SRI and has gotten 5.3 t/ha with 40x50 cm spacing (too wide for beginning). PhilRice has gotten 3.2-3.7 t/ha on its plots, but he felt that it is not managing its field very well, suggesting that PhilRice is making only a token effort. PRRM now wants to expand its SRI work to 7 municipalities. He suggested establishing some kind of SRI demonstration center for promoting its spread, saying that farmers need to see the difference for themselves. The PRRM SRI crop had 24-27 tillers per plant compared with 10-14 tillers in other fields. "I started to believe SRI after I saw this."

I commented that the poorer showing of SRI on PhilRice plots is not necessarily due to a lack of effort on its part. We often see lower SRI yields on experiment station plots than on farmers'

fields and think this is because of microbiological differences in the soil after years of continuous monocropping and application of fertilizers and chemical sprays. IRRI's plots are also producing very poor SRI plants though they are trying to get better results. Monocropping means that only one profile of exudates is being put into the soil to nourish the microbial communities there, and this leads to less species diversity. We think diversity is important for best SRI performance.

Teddy, a farmer from Isabella in the north, next reported on his experience with SRI. He said that he tried to get other farmers also to try 1 seedling per hill, but they were scared of losing their crop to snails. "When farmers passed by my field, they teased me," he said, echoing a comment we have heard from farmers in many other countries. He said that his transplanted seedlings did not change color and did not wilt as did those of other farmers. But the newly planted field looked pretty bad at first. People asked him, "Do you even have a crop planted?" Such derision we have also heard about from other SRI farmers.

When it rained, Teddy said, he had a problem with snails, because he had not put any drainage canals into his field, as he now knows he should have done. When he spread rice hulls on the field he was able to control the snails because the hulls' sharp edges cut snails like a knife. He kept the field moist and not flooded, as recommended, letting it dry up to the cracking point. But he made a mistake in not starting weeding the 10th day after transplanting, as suggested. Instead, he waited until the weeds appeared, about the 20th day, and then they were hard to get rid of. He had also made a mistake of starting with too large a field, 4,000 square meters of good soil and 5,000 meters of poor soil, before he had gained familiarity with the methods. It took two people a day to weed 1,000 square meters. Within 8 days, the weeds were back where they started. Fortunately, he found a weeder that is better-designed and easier to use for his second weeding at 30 DAT.

During the first and second months the field looked pretty unpromising. He couldn't see much growth. But then the third month, the tillers started appearing. And then lots of people were surprised, as his plants got 30-40 tillers compared to 10-15 in neighboring plots. He watered the plot only a few times, letting it dry up between weedings. He did only two weedings though more would have been better. He got 19 bags from the good part and 10 bags from the poor part. This was about three-fourths as much as he had gotten on that field before, but he spent only 12,000 pesos, so the financial return was pretty good. They did not sell the rice, keeping it for home consumption because it was chemical-free. "We learned a lot this last season, and next time I will do better," he said in conclusion.

Another staff member with PRRM in Nueva Ecija spoke next. His rice field is 4,000 square meters, but his father would not let him try SRI on the whole area, so he tried it on only 1,000 square meters. He had help in transplanting from other PRRM staff, but he described them with a laugh as "amateurs, pretending to be farmers." They transplanted at 40x50 cm spacing, instead of the 30x30 cm recommended by PhilRice, mostly because they wanted to finish quickly.

Because their transplanting was not very regular he could use the rotating hoe in only one direction and they had to do hand weeding as well. Neighbors were skeptical about the methods. He has pictures of people standing around the field looking at it. They said that they could not see that any seedlings had been planted. "I wish I could have charged people just for looking."

He had some problem with snails but limited them with water management. Despite all these problems, he got 10.75 cavans from the 1,000 sq. meters of SRI crop compared to 25 cavans harvested from the other 3,000 sq. meters. The SRI yield of 5.4 t/ha, about 30% higher than on the rest of the field, was a respectable one.

The Office of Provincial Agriculture (OPA) in Nueva Ecija got 150 cavans (7.5 tons) per hectare with SRI so they know the methods can produce more. One farmer who was impressed with the growth of his SRI plants asked for and got some of the SRI rice to plant, but he didn't get such a high yield with them, so it was clear that the good performance was due to the methods. Someone with PRRM had gotten 122 cavans per hectare (6.1 t/ha) using 30x30 cm spacing. Usually farmers plant at 17x17 cm spacing, so plant density is reduced by almost three-quarters with better results. One problem is that rotary weeders are not made very much any more. PhilRice is developing a mechanized rotary weeder. Bernie from Laguna commented on the question of weeding that if you flood the field for 5 days beforehand, it is fairly easy. He figured that it takes about 12 person-days per hectare.

Next a representative of WomanHealth spoke. Her NGO which works with women farmers in Isabela had done surveys which showed that women cultivating flooded rice have frequent vaginal and urinary tract infections (when women weed, they do so crouched down on their haunches). So when her NGO learned about SRI, it saw some possibilities for reducing women's health problems.

At first, women were really afraid to plant young seedlings, and only one per hill, with wide spacing. So they compromised with 2-3 seedlings per hill, instead of 4-5, but with wide spacing, 30x30 or 40x40 cm. "At first [after transplanting] you couldn't see anything, and the women were really afraid." But they found that the planting was easy ("light") and they could finish quickly. They had some initial difficulty in separating the tiny seedlings; "This takes time." Also, since the women did not have much control over water, their soil was usually more than wet. (This sounded like a pretty unpromising first use of SRI.)

However, the NGO representative reported, "The people are happy using the method." Their yield, 43 cavans from 0.7 hectare, was not very impressive, only about 3 t/ha. They usually got about 70-80 cavans. But this crop was hit by a typhoon during flowering. "Normally they would have lost the entire harvest." So they were very grateful for the SRI yield. They saw that the plants were more resistant to stress and also saved money otherwise spent for chemical inputs. And of course, there were personal health benefits.

Joe Riga said that if they would put more organic matter into the nursery soil, they could separate the seedlings easily. I suggested the "mix" that H. M. Premaratna uses in Sri Lanka for his seedbed, which produces seedlings yielding 10-15 t/ha: equal proportions of soil, compost and chicken manure. Joe suggested putting plastic underneath the nursery, with holes for drainage, so the seedlings can be lifted and carried to the field, but Bernie objected to this method because plastic is not biodegradable, so its widespread use could create other problems.

Next, Corrie from Consumers of Davao, an NGO in Mindanao, spoke. She said she is not a farmer but rather represents consumers, but was glad to be here with farmers. Her NGO has been

promoting SRI evaluations among rice farmers in the region. She provided a report from Ruel Carillo, a farmer in Matanao who planted V10 (a Masipag variety) in the second season last year, using 30x30 cm spacing. The plants had 96-day maturity and attained a height of 60 cm. His yield was 68 cavans per hectare (3.4 t/ha), under difficult El Niño climatic conditions, so the evaluation was considered a success.

Corrie said that consumers should become closer to producers, and not just try to buy things always cheapest, and not buy imports. "Farmers can be scientists without PhD degrees," she said, a statement that Fr. de Laulanié would have loved to hear. She asked participants to consider what kinds of data should be collected on SRI for scientific evaluation. She said that if farmers are given some standard format, they can contribute to this effort.

There were then some discussions about seed selection and seed supply that I could not follow completely. Obet showed me a list he had compiled of who has started evaluating SRI where in the Philippines. There are individuals or organizations working with SRI in nine of the 15 regions of the country. He thought that of the remaining six regions, three probably have farmers already trying out SRI, but their information has not reached the network yet.

- PRRM is working in Nueva Ecija,
- Pabinhi, a farmers' organization, in Mindoro, Guimaras, and region 5 of Luzon,
- The Philippine Greens in the Cordillera, Quezon, and Cavité,
- WomanHealth in Isabela,
- PLAN International in Southern Leyte
- The government's Office of Provincial Agriculture (OPA) in Bohol,
- Balay Davao Sur Inc. in Davao del Sur,
- Outreach Philippines, Inc. and Gratia Plena in Nueva Ecija,
- CORD, another NGO, in Isabela,
- The Department of Agriculture's Agriculture Training Institute (ATI) in Cotabato
- BIND in Negros, and
- Agtalon in region 1 of Luzon.
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Obet read this list to the group and said that it is probably not complete. The aim is to have at least one person or institution able to demonstrate SRI results to others in each region of the Philippines, and then to scale up (move down) to have someone in each province. Obet has produced a simple primer on SRI that is being distributed. He encouraged groups to make their own copies for distribution, and to make any improvements in it based on experience. If possible they should let him know of any changes so that he can come up with a better master copy.

Obet further noted that SRI, like any technology, contains an implicit worldview, and many people in the Philippines find the worldview implicit in SRI, stressing values of environmental and human health, use of local resources, equitable access, conservation of biodiversity, every congenial. I added comments on what we are learning about the importance of nurturing and benefiting from soil microbial communities. I compared them to workers, billions of them, who will work "for free" as long as they are given enough air, moisture, and organic matter.

The symposium closed about 6 o'clock with supportive statements from the president of PRRM, Wigberto Tañada, and Gani, head of PRRM's Institute for Sustainability, who chaired the

session. There was a shared feeling that SRI knowledge and practice have advanced considerably in the Philippines since the workshop on SRI held at PRRM the previous April. They now want to have a national SRI conference, or a series of regional conferences, before the end of 2003. There should be more and more cooperation among NGO, farmer, government and research organizations as positive results accumulate and interest spreads.