

**Report on Visits in Andhra Pradesh State of India, September 25-27, 2003,  
Regarding the System of Rice Intensification -- Norman Uphoff, CIIFAD**

Thanks to arrangements made by Dr. A. Satyanarayana, Director of Extension for the A.N.G. Ranga Agricultural University (ANGRAU) for the state of Andhra Pradesh (AP), I was able to have three days of intensive interaction with administrators, researchers and particularly farmers who are taking a growing interest in the System of Rice Intensification (SRI) developed in Madagascar some 20 years ago and now beginning to gain active interest around the world.

Dr. Satyanarayana, together with Dr. Jalapati Rao, Principal Scientists (Agro) at ANGRAU, visited Sri Lanka for five days at the end of January 2003, meeting with farmers there who have been using SRI methods successfully. This visit, arranged by CIIFAD, was hosted by SRI colleagues there. Dr. Gamini Batuwitage, at the time Additional Secretary of Agriculture and now director of the World Bank Poverty Reduction Program in Sri Lanka; W. Abeygunawardena from the Ministry of Agriculture; W. H. Premachandra, the leading SRI farmer in Sri Lanka, and others assisted in the visit. The hosting was in personal capacities because Sri Lanka's Department of Agriculture has not yet taken a positive position on SRI, even though its use and benefits are spreading in that country.

During our field visits, Satyanarayana told me of his own initial skepticism. For his first three days in Sri Lanka, he only asked questions, expressing no opinions of any sort. This made his hosts somewhat apprehensive. Only on the fourth day, having seen and heard a lot, did he start giving feedback, and the last day, he got photographs and powerpoint materials from Gamini to use for extension purposes in Andhra Pradesh. Upon his return, he prepared his own powerpoint presentation and publicized SRI methods on state television and radio as well as in the print media. Several hundred SRI trials and demonstrations were set up in farmers' fields and some on research stations for the current kharif (wet) season. I was visiting AP to see these for myself.

Thursday, September 25: Upon arriving in **Hyderabad** mid-morning, Satyanarayana took me to the Department of Agriculture headquarters for a meeting with AP's Agricultural Commissioner, Mr. Sutirtha Bhattacharya, and with all of the district heads of agricultural extension and many senior agricultural researchers. Satyanarayana and I made short presentations on SRI and then responded to questions for about an hour. There was obviously still some skepticism from certain researchers, but most of the extension staff had already gotten positive feedback from farmers, so the overall tone of the discussion was receptive. Andhra Pradesh faces increasingly critical water shortages, so any production methodology that can raise yields while using less water -- and also reducing costs of production, a serious problem for AP farmers -- now gets a serious hearing.

Afterward, Satyanarayana and I drove to Ramoji Film City at **Anazpur** outside Hyderabad, where 2,500 acres are being developed for movie sets and tourism by Mr. Ramoji. Beautiful grounds and fine hotels make it quite an attraction. As a public service, the corporation produces and broadcasts agricultural information programs in 11 Indian languages through the E.Tv channel, reaching farmers throughout most of the country. We had lunch in a splendid restaurant, incongruously looking out over manicured lawns as we talked about SRI, with Dr. Ranga Rao head of the agricultural information dissemination program, and Dr. Appa Rau, former vice-chancellor of ANGRAU and director of Ramoji Film City.

Dr. Appa Rao, at 75, outpaced the rest of us in our visit to nearby SRI rice paddies after lunch. Satyanarayana was pleased to see that at Film City itself, there are three SRI trials instead of the one initially planned. One used the seed of a very fine variety of rice that he had brought back from Sri Lanka. A respectable-sized plot had been planted from just a handful of seed because SRI reduces seed requirements by about 90%. All were pleased with the tillering of the growing crop, although no assessment of performance can be made until harvest in about 2 months.

We drove over some rough roads to get to an SRI trial being done under more typical farming conditions. Appa Rao led us along paths and bunds to the field 100 m from the road. Though the soil was not considered particularly good and the water control left something to be desired, the difference between the SRI plot and the adjoining 'normal' plot was obvious, particularly when a laborer pulled up plants from each and washed the roots off in the field channel. The differences in size and color were striking, something that I would see again and again during the field visit.

After making a stop at the university, we had dinner that evening with Mr. Anil Epur, a Hyderabad businessman and past president of the southern region of the Confederation of Indian Industries, as well as a former student of mine some 30 years ago when he attended Cornell. Anil is working with an NGO to introduce SRI in his home area near Warangal. Satyanarayana and I got to the Hyderabad railway station by 10 o'clock for our planned overnight trip to **Godavari delta**. This is known as the 'rice bowl' of Andhra Pradesh, and considerable SRI work has been started there. Because of an unexplained delay, however, we did not leave for another hour and a half. So we got into **Bhimavaram** the next morning later than expected, which put us behind schedule all day, unfortunate but unavoidable.

Friday, September 26: We were met at the station by local agricultural extension staff and were taken to a college newly built by a local industrialist on the outskirts of the city, another example of apparently growing private philanthropy in India. Unhappily, an overnight encounter with a local version of "Montezuma's revenge" kept me from enjoying the breakfast prepared for us, and it sapped some of my usual energy for the field visits during that day and the next.

Our review started in **West Godavari** with a visit to the village of **Akiveedu**. Mr. Sudhakara Reddy, together with dozens of villagers, met us to show us his SRI plots. He has planted 10 varieties on 3.2 acres using the new methods, seeking to see which perform best with SRI. Satyanarayana told me that this farmer had previously experimented with using single seedlings and reduced irrigation, so SRI required no big change for him. Everyone was pleased with the growth of SRI crop, pointing out the dark green color of the plants, their uprightness, the sturdiness of their tillers, etc. Reddy eagerly pulled up some of his plants to show us the magnificent growth of their roots and their bright white color, an indication of healthiness.

A makeshift tent with dozens of plastic chairs had been set up by the side of the field where a formal Indian welcome was given, with a huge flower garland and shawl. I explained that I had not discovered SRI, the methodology with which they were so pleased; this had been developed by a French Jesuit priest, Fr. Henri de Laulanié, who spent much of his life in Madagascar working with farmers to improve their rice production. I have only been trying to get his ideas disseminated and to have SRI methods tried beyond Madagascar.

One farmer, Mr. Ramesh from Kaikaram village, introduced himself saying that he was disappointed I would not be able to visit his SRI field on this trip. He said he was one of the first in his area to plant with SRI methods, he said. He had traveled 40 km to come and meet me here, He dragged out a shoulder bag one of his SRI plants with splendid tillering and impressive roots to show me proudly. Such enthusiasm for SRI was the first of many such demonstrations from farmers during the two days in the field.

After questions and discussion at Akiveedu, we moved on to the KVK (Farm Science Center) at **Undi**, to see SRI trials there. ANGRAU's training organizer usually there, Dr. D. Jagannadha, was attending a national workshop, but he had prepared for me a thick (41-page) bound note with information on the trials being conducted there to evaluate the effects of differences in plant spacing and age at transplanting, and also to see varietal responses to the methods. This is being done in a very systematic way. With harvest still some weeks off, the note could provide data only on plant tillering to date, but the trials have already generated much interest among farmers in the area and will give everyone a better understanding of how SRI practices can best be varied to meet local conditions.

We next visited several more villages. At **Vinjaram**, Mr. Badiga Satyanarayana eagerly showed us his SRI plots. One he had transplanted with seedlings just 5 days old; the other with seedlings 10 days old. I wished that I had seen the first plot before our meeting with researchers the previous day in Hyderabad. One had told us with certainty that AP farmers will have difficulty transplanting very young seedlings, so SRI will be difficult to get adopted here. This farmer, however, on his own had successfully planted out seedlings even younger and smaller than we recommended, 8-12 days old. When asked about difficulties in doing this, he said he had none. This is not the first time that we have seen researchers underestimating what farmers are able and willing to do with SRI.

At **Ballipadu**, I wasn't feeling up to a walk to the field of Mr. T. Srinivas Rao, so instead talked with villagers who gathered around the car while others made the trek. Mr. K. V. Rao, president of the Water Users Association in Ananthavaram, who was traveling with us and who sported the most splendid handlebar mustache that I saw during the whole visit, also stayed behind and joined in the discussion. He is one of main farmer leaders in the state, being general secretary of a Water Users Association Presidents Association and honorary advisor to the Andhra Pradesh Water Users Association Presidents Forum. Given the water saving possibilities with SRI, he is particularly supportive of SRI, having tried it out himself successfully this season. I was told that the SRI field was excellent, with healthy root and shoot growth coupled with sturdy tillers.

At **Achanta**, we visited the home of Mr. N. Subba Rao, not having time to go to see his field. Many farmers and local officials were gathered there, and he had a beautiful display with carefully handwritten labels all set up for us to show the difference between SRI plants and conventionally-grown plants, emphasizing their roots. Mr. Rao was introduced as one of the 'pioneers' for modern rice cultivation in Andhra Pradesh, having been the first to plant the high-yielding variety IR-8 from IRRI. He had been visited by the first director-general of IRRI, Dr. Robert Chandler, by the head of IRRI's plant breeding program, Dr. Gurdev Khush, and by many other rice specialists. He proudly showed me a photo album with pictures of his many visitors.

That Subba Rao was a farmer leader in India's Green Revolution based on new varieties made it all the more gratifying to see him so enthusiastic about SRI, which depends on changes in management practices. As we admired the health and vigor of the plants he had on display, I commented on the importance of plants' having large, functioning root systems. Several times during the day, I had asked farmers why they had not noticed before that their rice plants' roots are small and deteriorated under continuous flooding? The response was they just hadn't paid any attention to plant roots before. But now thanks to SRI, they can see how large and beautiful the root systems can become with proper care. They now appreciate that these are very important for plants' performance and health.

My suggestion that maybe SRI could be called "the Root Revolution" thus was quickly assented to as we talked on Subba Rao's veranda. That better roots and healthier crops are achieved by using less water makes SRI practices that much more attractive, because AP farmers are becoming acutely aware of the need to adjust to growing water shortages. Also, at all stops farmers commented on reduced problems with pests and diseases in SRI rice.

Late in the afternoon we got to **Maruteru Rice Research Station**. We visited its SRI trial plot, just 0.1 ha, reflecting initial hesitation by researchers to take the method seriously. (Satyanarayana told me of one university colleague who had attended my presentation on SRI to an agronomists' meeting at ANGRAU in May 2002, Dr. R. A. Raju, told him that he had not believed what he heard; now with good results coming in, he regrets not being more receptive.)

Researchers at Maruteru have observed that:

- Seedling establishment with SRI cultivation is very good (99% of seedlings survived),
- In general, seedling growth is satisfactory, and
- Root mass, volume and activity are higher in SRI rice compared to normal rice.

Data provided by Dr. P. V. Satyanarayana at Maruteru for variety MTU 1061 showed the following differences in tillering achievable with SRI practices:

Method	Spacing	@ 6 weeks	@ 7 weeks	@ 8 weeks	@ 9 weeks	@ 10 weeks	@ 11 weeks	@ 12 weeks
SRI	30x30	7.9	19.2	23.7	29.2	33.3	37.4	39.2
Normal	30x30	6.0	10.5	16.3	19.5	21.3	22.9	23.0
Normal	20x15	4.5	6.4	7.9	8.9	10.0	11.3	12.0

Wide spacing (30x30) with other methods 'normal' produced almost as much root volume and total dry matter (g/hill) as did the all-SRI plants, but shoot dry weight of SRI plants was 83.08 g compared to 75.10 g for the normal + wide spacing plants and 45.40 g for normal-practice plants.

The most important data will become available only when the trials are harvested at the end of the season, but the results so far have already made Maruteru researchers want to carry out larger and more thorough evaluations next season. They should be able to provide the kind and detail of data that researchers elsewhere who have remained skeptical about SRI want to see. Maruteru is one of the leading rice research stations in Asia, which means in the world, so their conclusions should carry a lot of weight, though ultimately it will be farmer evaluations that count the most.

It was a long drive from Maruteru in West Godavari to **Mukkamala** village in **East Godavari**, and we did not arrive until after 6, in pitch darkness. Satyanarayana said that farmers here had been waiting for us since 4:30, and some who had come from long distances to meet us and express their satisfaction with SRI had not been able to wait so long and had returned home.

It was a shock to step out of the car and be greeted by a blast of exuberant trumpet-blowing and loud drumming. I found myself in the middle of something like a religious procession with dozens of farmers sweeping me, Satyanarayana and the others along in darkness to the schoolyard, where Satyanarayana and I were installed in chairs behind a table with flowers and elegant vase, being received like demigods.

One by one, I was introduced to farmer representatives who put big garlands of flowers around my neck, posing for pictures with a handshake as flashbulbs illuminated a festive scene. There was no opportunity to explain that SRI was not my creation, that I am only the disseminator of knowledge about it. I was thinking of how fitting it would be for our Tefy Saina colleagues in Madagascar, Sebastien Rafaralahy and Justin Rabenandrasana, to be here in my place. They had 'kept the SRI flame burning' during years of disinterest and even disparagement in their home country until Glenn Lines and I on behalf of CIIFAD and then others 'took up the torch.'

By the time I had more than a dozen large garlands draped around my neck, I thought how these would probably obscure Sebastien and Justin. My forehead was daubed with red paste, and there were speeches of appreciation for the introduction of SRI. Farmer enthusiasm was great for the accelerated growth of their rice plants, something considered all the more marvelous because it was being accomplished with less irrigation water, something never imagined possible.

Satyanarayana told me that the farmers' association in this village is one of the most progressive in the state, quick to take up innovations. There was obviously a high degree of organization and a strong sense of morale. I told the farmers that SRI was something developed in Madagascar by Fr. de Laulanié; my role is to share knowledge about SRI with farmers in many countries around the world. I stressed that SRI is not finished -- it is still being developed and improved through farmer innovations and research efforts. I told them that 5 and 10 years from now, there will be many SRIs, thanks to such innovation. Farmers presented me with, as momentos, two beautiful wool scarves and a large laminated picture painted by a local artist of a (somewhat Anglicized) rural village scene.

I told them that in Tamil Nadu, when asked many questions by farmers about 'how to do SRI?', I had responded by asking them in return whether there are different words in the Tamil language for 'instructions' and 'ideas'? When told that there are, I suggested that they should be asking us for 'ideas' rather than for 'instructions.' SRI is not a blueprint, but rather a set of concepts and insights into how rice can be helped to grow best. These ideas should be adapted and adjusted to local soil, climatic and other conditions such as labor constraints. We are glad to share our ideas and experience, but we expect farmers to use their own intelligence and experience to make the most of SRI concepts. This group of farmers, used to taking initiative, seemed to understand quite well the distinction I was suggesting. I was impressed to see the several weeders that they showed me proudly, ones that they had designed and built themselves for use with SRI methods.

They would like to have shown us their SRI fields and to discuss their experience at length, but it was pitch dark and we had to catch a train at **Rajamandry**, an hour and a half's drive away. We finished the leave-taking about 7 o'clock, heading off for an 8:40 train connection. We got to the railway station with 10 minutes to spare.

Saturday, September 27: The train reached **Warangal** in the interior at 3:30 am. We were met on the station platform by Dr. Jalapati Rao, who visited Sri Lanka in January with Satyanarayana, and several of his colleagues. We were taken to a state circuit bungalow for several more hours of sleep, and then had a good iddly breakfast before starting field visits. An entourage of journalists joined us, as during the day before, from All-India Radio and other media.

At the village of **Reddipuram**, Mr. Shouri Reddy and other farmers met us along the road and walked us to his SRI field. One of the videographers, himself an agricultural scientist, kept commenting on how tall and uniform the rice plants were. Like other farmers who are using SRI now, Reddy pulled up some of them to show us what fine root growth the plants had. I said that we all need to be patient in drawing conclusions about SRI until we get the harvest in 6-8 weeks' time. With biological processes, there can be surprises and disappointments, as well as boons. Farmers in the village are following Reddy's crop with much interest, as they are doing in all the villages we visited. If the SRI harvests meet current expectations based on plant growth to date, farmers say that SRI spread will be rapid because it offers so many advantages.

At the **Warangal Agricultural Research Station**, there was a large gathering of researchers, farmers and several NGO representatives. Anil Epur had come up from Hyderabad to join us, along with S. Jaipal Reddy, chairman of NRAFORD, the N. R. Reddy and Abhinay Reddy Foundation for Rural Development, an NGO based in Warangal that is promoting SRI evaluation in the area. Dr. Jalapati Rao presided over a large meeting where Satyanarayana showed his SRI PP presentation, and I added thoughts and observations, followed by questions and discussion.

After the meeting adjourned, we drove some distance to the village of **Konkapaka** to meet a farmer, Mr. Madhusudhan Rao, who had read about SRI in the local agricultural magazine *Annadata* written by Dr. Satyanarayana and decided took it up on his own. The Department only came to know about this when he came to it to ask about getting a weeder. He had found the recommended method for spacing young transplants, using strings, too tedious, so he had constructed a wooden rake with evenly spaced tines to mark a grid on the surface of the paddy field. This time-saving innovation had been first made by a Malagasy farmer in 1998, to improve upon the system developed by Fr. de Laulanié. So it is a reinvention, but it showed us once again the value of farmer ingenuity.

I talked briefly with Rao's son, in the 8th grade of school, whose English was excellent. I asked him what his mother thought about this experiment. 'Did she bless it, or did she curse it?' Dr. Rao asked, rephrasing my question. "She cursed it, sir," was the reply. But he added that she is now very happy with SRI. I told them about a Cambodian farmer who had reported to our national SRI workshop in Prey Veng last January, that when he first planted SRI -- against his wife's wishes -- she moved out of the house in anger. But once the profuse tillering started, she came back, and once the large crop was harvested, they were fully and happily reunited.

Several times during the two days, farmers mentioned how much skepticism and even mockery they encountered from neighbors during the first weeks of SRI crop establishment. The field looks almost barren for the first month. But once the tillering accelerates, other farmers become very interested. Many attribute the growth spurt to some new seed variety, but SRI farmers explain that this is achieved just by changing management practices, and higher production can be achieved with any seed variety.

In Bangladesh, I was told that SRI farmers had a problem with neighbors stealing some of their crop to get the seed, not understanding yet that this will do them no good unless they adopt the new practices as well. With the kind of media coverage that SRI has gotten already and will get in the next few months, especially if the harvest lives up to present expectations, there should be no confusion about what is the source of the productivity increase.

By the time we left M.S. Rao's field, there were large, dark rain clouds gathering, and by the time that we got to the place of our last planned visit, not far from Anil Epur's home village, the road off the paved highway was too muddy to get to the SRI plot that farmers wanted to show us. We made a halt at Tallapurapalli, where NRAFORD maintains a village center, and had a short meeting with several dozen farmers.

It was evident from the farmers that there is keen interest in SRI based on what they have seen so far, and from what they have heard from others. NRAFORD as an active program of village service in the area and should be able to assist the spread of SRI information. But probably the main channel of communication will be 'farmer-to-farmer,' so long as SRI results are good.

We got to the **Mahabubabad** railway station with another hurried drive, this time 5 minutes before the train was scheduled to arrive, but actually with 20 minutes to spare. The rains that started again drove everyone under the large tin awnings. Our travel companions got Anil, Satyanarayana and me onto the train bound for Hyderabad with more to carry than we had left with. The laminated picture was awkward to carry but much appreciated as a memento because it was given by farmers in appreciation for what they could see SRI is bringing to them.

On the way back, I could read the report handed me by Dr. Rao at the Warangal Agricultural Research Station. In Andhra Pradesh as a whole, 4 million hectares of rice are cultivated in the rainy (kharif) and winter (rabi) season, with yields as high as 8 t/ha but an average around 4 t/ha. The growing scarcity of water in the region presents a big threat to the rice sector as crops are often subjected to water stress at flowering, after excessive use of water in the initial stages.

Low initial rainfall is leading to the fallowing of more and more rice-growing area. Also, pest and disease intensity is growing "because of unscrupulous use of inorganic fertilisers and improper plant protection measures," the report said. Dealing with this problem is almost as important as coping with water shortage. Given the Research Station's assessment of rice sector constraints, it is easy to see why SRI is attractive and now getting serious evaluation by researchers and farmers.

In Warangal district, verification trials have been taken up in about 18 locations on farmers' fields, and the SRI crops are between 30 and 80 days old at present. The data collected so far

indicate 30-80 tillers/plant compared to 14-20 tillers/plant with traditional methods, and with "high vigour and synchrony." The report said about farmers' perceptions:

In the beginning, it was felt difficult to make the farmers to adopt the 'SRI' practices, particularly planting with tiny seedlings and weeding with rotary weeder. But to the surprise, all the farmers in 18 locations adopted the practice without much difficulty. Few farmers also prepared wooden markers to enable them to adopt proper plant spacing. They are happy with the present crop growth and expressing willingness [to plant SRI] in a larger area in the ensuing seasons.

The farmers in the surrounding areas are keenly observing the 'SRI' practice and expressing willingness to adopt and eagerly waiting for the final result... all the practicing farmers indicated very less quantity of irrigation water [used] compared to normal rice ecosystem.

For the spread of SRI, the availability of rotary weeders will be an important factor, and possibly a constraint. Their cost is actually quite modest; I was told it is about 500 rupees for a locally made weeder (\$10). The value of the water saved with SRI is such that the government could justify giving weeders away free if this would facilitate farmers' adoption of SRI water-saving methods. Indeed, the government could save enough money in just one season from having a reduced demand for subsidized fertilizers and pesticides thanks to SRI that it could easily afford to give every rice farmer a free weeder, which could then be used for many seasons to come.

The Warangal Station report concluded with the comment that the District Collector has visited a SRI demonstration plot and had "expressed happiness" that SRI saves water and is eco-friendly, wishing this practice to spread to a larger area as early as possible. The report also stated that the Minister of Agriculture has seen SRI trials in farmers' fields and at research centers and wants the advantages of SRI to be explored, advising extension staff to verify the results and popularize SRI among the farming community.

At every opportunity, I reminded people, farmers and researchers alike, that we need to keep any enthusiasm in check until the harvest results are in hand and have been evaluated. But given the positive experience with SRI methods in other countries, I have every reason to expect that -- especially given the fine plant performance being seen in almost all locations with SRI methods -- there will be very favorable results this season in Andhra Pradesh. If so, this state, which is one of the major centers of rice production in the world, is ready to move quickly to take advantage of the opportunities to save water, reduce costs, enhance incomes, promote food security, and protect environmental resources that SRI offers.

The state has an excellent and attentive research and extension infrastructure in place and a motivated, innovative farming community. This would not be a top-down imposition but a multi-faceted, cooperative effort with farmers in the leading role, driven by a combination of need and opportunity. Both SRI proponents and skeptics will be awaiting the harvest results from Andhra Pradesh with much anticipation. I appreciate the thoughtful and imaginative efforts of Dr. A. Satyanarayana, Director of Extension, ANGRAU, Andhra Pradesh, India, and of the many dedicated extension staff and researchers who are working with farmers to promote SRI.