

REPORT ON A VISIT TO ETHIOPIA IN SUPPORT OF THE INTRODUCTION OF SRI
July 26-31, 2008 – Norman Uphoff, CIIFAD [DRAFT]

Like most other initiatives for introducing SRI, this effort took shape from a network of personal associations, starting with previous work on SRI by **Dr. P.N. Ananth** in Kerala state of India. He had played a key role in getting SRI more widely known and used there in 2005 and 2006, while posted at the Farmers' Science Center (KVK) in Mitraniketan. His first-year results gave average SRI yields over 7 t/ha compared with usual yields in the district of 3-3.5 t/ha. With some support that CIIFAD was able to provide him from a small grant by the Triad Foundation in Ithaca, NY, Ananth helped KVKs in Kerala train over 1,000 farmers in SRI methods. Also 500 government personnel were introduced to SRI before he left Kerala for a training program in the Netherlands.

Subsequently, Ananth was hired for a university teaching position in Ethiopia, and then he joined **SRI SAI Consultants** (no relation to the System of Rice Intensification) as a senior advisor for agricultural extension, doing training and consulting for businesses in Addis Ababa. Once reestablished in Ethiopia, Ananth resumed his contact with the SRI network, and with support of colleagues in Addis Ababa, Ananth asked whether I could visit Ethiopia some time to help promote SRI there. Since I was going to participate in an international workshop on conservation agriculture and soil health at FAO headquarters in Rome the third week of July, I suggested a visit during the last week of July, and Dave Galloway generously agreed to cover the additional air fare to Addis from Rome.

In October 2003, I had visited Ethiopia in connection with a project on watershed management in the Woldiye region with which CIIFAD was working -- a USAID project being implemented by Virginia Tech. The project office at the time was in Bahir Dar on the edge of Lake Tana, the area where most of Ethiopia's little rice production was done, on just a few hundred hectares. Rice is not a traditional crop in Ethiopia, having been introduced by the North Koreans in the 1970s during a previous military regime which ruled the country rather ruthlessly before being ousted in 1991. The main staple food sources are other grain crops: millet, sorghum, and especially teff.

While in Bahir Dar, I made contact with **Amhara Regional Agricultural Research Institute** and spent a Sunday afternoon with two researchers from ARARI, one of whom was conducting rice research. They expressed interest in SRI, as did half a dozen farmers with whom we talked during an impromptu field visit to the rice-growing area. However, as far as I could tell, nothing came out of these discussions. Since Ethiopia did not have much rice area, it has not figured prominently in our efforts to get SRI introduced in Africa. However, an opportunity to visit an African country where there was interested sponsorship for SRI, and especially a country where food needs are so great and urgent as they are in Ethiopia, was sufficient reason to come.

Because we have been finding in India that SRI methods can be productively extended or extrapolated to other grain crops, I suggested exploring whether systematic efforts could be made to use SRI concepts and practices to improve the production of other crops beside rice. This made the prospect of my visit more interesting to colleagues in Ethiopia. Also, I suggested that we have some discussions on issues of soil health and restoration, the theme of the Rome workshop, soil degradation being one of the most pressing problems facing Ethiopia. My hosts for the visit readily agreed.

Arriving Saturday morning, the 26th, at the airport in Addis Ababa, I was met by Ananth and his colleague, **Dr. Satishkumar Belliethathan**. Satish is coordinator for an unusual NGO called the **Horn of Africa Regional Environmental Center/Network**, which was co-sponsoring my visit together with SRI SAI Consultants. He explained that his organization, which has affiliates across the East African region, was started as an educational center at the **University of Addis Ababa**, with Dutch support. But now it has differentiated into two entities, almost like cell division. Complementing the Center, which undertakes environmental education, the regional network is engaged in a variety of initiatives including advocacy. A colleague in the Faculty of Science, **Dr. Mekuria Argaw**, now directs the Center, while Satish heads the Network.

Through Satish my visit had the support of the dean of the Faculty of Science at the University of Addis Ababa, **Dr. Araya Asfaw**. He in turn got the Deputy Prime Minister to agree to inaugurate the SRI workshop planned for Tuesday. Unfortunately, by the time that the workshop was held, other demands had intruded on the Minister's time, but even before I arrived, one could see the kind of inter-sectoral cooperation for SRI emerging in Ethiopia that we seek in all SRI country initiatives: government agencies, non-government organizations, universities, and private sector. With such a base, getting the involvement of farmers to round out this 'alliance' is not very difficult, provided that such an expanded and participatory network is envisioned from the start.

SRI SAI operates a modern guest house in the center of the city, so that became my base of operation for the week. I spent the weekend preparing three powerpoint presentations for the Tuesday workshop, and talking with Ananth, Satish and my host, **L. G. Reddy**, general manager of SRI SAI. Sunday evening at six, there was a press conference with reporters from half a dozen newspapers which lasted over an hour and generated good coverage in the press.¹

Meetings with Potential SRI Stakeholders

Satish and Ananth had set up several pre-workshop meetings on Monday to initiate thinking about follow-up, so that collaborative efforts could grow out of what was learned and discussed in the workshop. Our first visit was to the office of **Oxfam America** at 8:30. Dr. Araya from the university and Mr. Reddy of SRI SAI Consultants joined Satish, Ananth and me for the meeting with **Mr. Abera Tola**, regional director for Oxfam's Horn of Africa program, and Oxfam staff.

¹More background on personal networks: This SRI initiative grew from the fact that both Ananth and Satish had been graduate students together at Tamil Nadu Agricultural University (TNAU) in India some years ago. They reestablished their friendship when both took up residence in Ethiopia. Reddy's consulting firm operates primarily in the sphere of business and management, but he comes from a farming family in India and quickly became interested in SRI when Ananth told him about it and was willing to provide private-sector backing for this initiative, for the sake of Ethiopia's agricultural development. Concurrently, when Satish informed Dr. Araya at the University of Addis Ababa about SRI's potentials, he quickly got the dean's support for this effort. After arriving in Addis, I learned that one of Satish's faculty advisors at TNAU had been Dr. T.M. Thiyagarajan, the first agricultural scientist in India to take an interest in SRI, starting evaluations of the new methods in 2000. TMT's efforts led within a few years to backing from the state government SRI expansion, its spread reaching 430,000 hectares by 2007.

Abera had been informed about my planned visit by an Oxfam America agricultural advisor in the Boston home office, Tim Mahoney. The Oxfam staff with whom we met were very positive. They expressed willingness to engage in field-based collaboration with anyone wanting to try out SRI and would help extend it as warranted by productivity results and favorable farmer response. Oxfam America has linkages to many other NGOs working on food security issues in Ethiopia and East Africa, so its cooperation would be very important for any SRI initiative in the country and region. Improved food security is a priority concern for Oxfam America, they said.

Mid-morning we met with **Dr. Tareke Berthe**, representative in Ethiopia of the **Sasakawa Africa Association** (SAA) program and head of the Regional Rice Program of **Sasakawa-Global 2000**. Originally a specialist on teff, the grain most widely and popularly consumed in Ethiopia, Tareke is now leading a rice initiative that is achieving remarkable progress there.

We met also with other Sasakawa program leaders: two agronomists with extensive experience in Ethiopia, **Dr. Abera Debele**, and **Zewdie Beza**, and a post-doctoral fellow working with the SAA rice program, **Dr. Negussie Zenna**, who recently finished a PhD in rice science at IRRI. SAA is a non-profit organization established in 1986 with funding from the Sasakawa Foundation in Japan (now called the Nippon Foundation) to support science-based efforts to help small farmers in Africa meet the urgent food needs of their countries.

Dr. Norman Borlaug has been the technical leader of SAA initiative, and SAA has become allied with the Global 2000 Program set up by the Carter Center in the U.S. This latter program created by former president Jimmy Carter has essentially the same objectives as SAA, so their combined program, **Sasakawa-Global 2000**, have been ‘hyphenated’ for years, focusing at present on agricultural improvement in Ethiopia, Mali, Nigeria and Uganda.

Tareke and his colleagues explained the activities that they are working on. Although rice is not a traditional staple in Ethiopia, demand for it has been rising rapidly, in part due to the growing size of the expatriate community in the country. But rice is also popular in restaurants and in a growing number of homes. Expansion of rice production has been promoted by SAA-Global 2000 with emphasis on the use of the Nerica varieties developed by the African Rice Center (WARDA). The data given for expansion of rice-growing area (in hectares) are impressive:

	Rice area -- with Nerica use	
2005	6,000	10
2006	18,000	2,000
2007	49,000	11,000
2008	91,000	18,000

Only 10% of the current rice area is irrigated land; 60% is on rainfed lowland, in valleys, and 30% is on rainfed upland, in hill regions. Tareke said that they estimate there are potentially 20 million hectares of potential rice area in Ethiopia, relatively little of it irrigated. They were glad to learn that SRI methods have been adapted to unirrigated production in several Asian countries. NGO programs in India, Myanmar and Philippines have gotten rainfed SRI yields of 7 t/ha.

The SAA-Global 2000 effort in Ethiopia has focused mostly on germplasm introduction, varietal release, and seed multiplication, as well as on training, promotion of rice recipes to expand consumer demand, communication with the public, and policy advocacy with the government. At SAA-Global 2000 initiative, a National Rice Promotion Committee has been formed, and there is growing support for rice development in the country, they reported.

Finding cold-tolerant varieties is a priority for getting rice grown more widely in upland areas where poverty is greatest. Although there has been also an emphasis on expanded fertilizer use, SAA appreciates the need, however, Tareke said, for organic matter in the soil in order for chemical fertilizers to be efficient. Production improvement strategies include combinations of fertilizer, organic matter, rock phosphate, and legume rotations (cowpea or soyabean). SAA-Global 2000 is now introducing *conservation tillage* (no-till) in a number of areas. Tareke and the others said that they would attend the workshop and cooperate in follow-up activities.

At noon, we visited **Sue Edwards**, director of an NGO established in 1995, the **Institute for Sustainable Development** (ISD). She has lived in Ethiopia for almost 40 years so knows the country well and is well-known. Her husband, Dr. Berhan Egziabher, is current Director-General of the Environmental Protection Authority, and both of them have been at the forefront of environmental and sustainable development issues in Ethiopia for many years. ISD is one of the core members of the Horn of Africa Regional Environmental Network, so Sue and Satish have worked a lot together. Originally trained as a botanist, Sue has become much involved with land degradation and restoration challenges, given that Ethiopia has gone from a once heavily-forested country, to one now with less than 2% forest cover, having once had about 40%.

Through the *LEISA* magazine on low external-input sustainable agriculture published in the Netherlands, Sue said she already knew about SRI and could see many convergences of its principles and results with the work that ISD has been doing with organic agriculture in Tigray province. She gave me a paper that she has written with colleagues on ‘The Impact of Compost Use on Crop Yields in Tigray, Ethiopia, 2000-2006 inclusive.’

The ISD project in Tigray started with 4 communities in 1996, and ten years later is working with 57 communities. The paper summarized results from farmers’ fields, comparing yields of 7 cereal crops (barley, durum wheat, finger millet, maize, sorghum, teff, and *hanfets*, a mixture of barley and durum wheat) over a seven-year period. The crops were grown with no fertilization, with chemical fertilizer, or with compost. The number of observations ranged from 222 to 327 for grain, and from 202 to 393 for straw.

	No input	Fertilizer	Compost
Grain (in kg)	1,200	1,812	2,473
Straw (in kg)	2,477	3,404	4,073

Sue said that SRI concepts and methods are of interest to ISD, the more so as they are being adapted to other crops and direct attention to soil fertility as affected by the soil biota. She was very interested in participating in the workshop and in being involved with any follow-up work.

From ISD, we went to the **University of Addis Ababa** campus, where we met **Mekuria Argaw**, director of the Horn of Africa Regional Environmental Center, and several of his colleagues in the Faculty of Science for lunch at a restaurant off campus. After lunch, we met with Mekuria at the Center on campus to discuss its program. The Center is fairly new, initiated by the Faculty of Science in 2006. It was established to bring academia and civil society together for better environmental policy and management in the country and the region. The Center's purpose is to generate better knowledge for environmental management through collaborative research, while the corollary Network links Ethiopian NGOs and academics with like-minded colleagues throughout East Africa.

Having connections down to the community level means that the Center's research is better positioned to be 'demand-driven.' At the same time, interaction with national and international partners, especially through an annual regional meeting that rotates among countries, means that local action is informed by 'the big picture,' addressing large-scale concerns like climate change and sustainable land management.

One of the Center's current projects is to support establishment of a large botanical garden on the outskirts of Addis Ababa. This 700-hectare area contains much biodiversity threatened by expansion of the city. It will serve as a center for environmental education for school children and the general public, also representing a purposeful move to protect biodiversity in the region. The city administration has agreed with the University to set aside this area from development, but adverse pressures from economic interests are still strong and need to be fended off.

The day as a whole was a very useful one, strengthening contacts with a variety of organizations that can become stakeholders in an SRI initiative. Satish and Ananth had done a good job of identifying potential partners, leading to discussions that were both collegial and substantive.

National SRI Workshop, July 29

Due to logistical problems, the workshop at the Imperial Hotel began half an hour late, but there was a very experienced and diverse group of about 50 participants assembled, from government agencies, NGOs, the university, and private sector, with also a few persons who identified themselves as farmers. The welcome and introductions by Reddy, Dr. Araya and Satish underscored that the purpose of the workshop was more than simply informing. The aim was to identify partners and team members who could follow up what was learned with trials, demonstrations and programmatic development to take advantage of whatever benefits SRI could bring to Ethiopian agriculture.

I then made the first of three powerpoint presentations that would provide the substantive focus of the workshop, on '**System of Rice Intensification: An Overview and an Opportunity.**' (This will be posted, along with the other two presentations, on the Ethiopia page of the SRI website at <http://ciifad.cornell.edu/sri/>). The presentation reviewed experience with SRI in a number of other countries in Asia, Africa and Latin America and laid out the key practices, principles and findings so far. Constraints and limitations were also discussed.

When I finished, colleagues from SAA underscored that these changes in management practices, which are clearly beneficial for growing rice, are not in conflict with genetic improvement. This

I agree with and had already stated in the presentation. Questions were raised about whether stopping the flooding of paddy fields would reduce crop water demand or not, and whether mycorrhizal fungi can enhance rice yields significantly. Both questions I could answer with explanations based on experience and research results.

A question was raised about my reporting that SRI rice plants are more resistant to pests and disease. The beneficial effect of wider spacing for reducing pest and disease problems was acknowledged, but how could the general effect be explained? This question prompted me to explain the theory of **trophobiosis** presented in Francis Chaboussou's book, *Healthy Plants: A New Agricultural Revolution* (2004). This theory makes sense of SRI experience. It ascribes plants' vulnerability to insects, bacteria, fungi and even viruses to *imbalances or deficiencies in plant nutrition*. Applications of nitrogen fertilizer increase the uptake of N and the synthesis of amino acids – at a rate faster than the plant's synthesis of amino acids into proteins, which are complex molecules that pests have less access to. Chemically fertilized plants have a surplus of amino acids in their sap and cell cytoplasm.

Similarly, use to chemical pesticides, particularly chlorinated ones, affects plant's metabolism adversely so that the simple (reducing) sugars created by photosynthesis are not quickly converted into polysaccharides, complex molecules that, like protein, are not easily accessible to pests. So there is an abundance of sugars in the sap and cytoplasm that attract and feed insects, bacteria, fungi and viruses.

SRI plants are, as a rule very healthy, attributable to well-balanced nutrition. We think that their rapid rate of growth means that there are no excesses of amino acids and simple sugars in the sap and cytoplasm to attract and nourish insects, bacteria, etc. I had brought a copy of Chaboussou's book to leave in Ethiopia, and Sue Edwards said that the IDS library also has a copy, which is open to anyone.

Dr. Tareke Berhe commented that he found little discussion in the SRI literature of how certain *combinations* of organic and inorganic fertilization might be optimum and wondered why. I said that we have had no funding for research, to do the kind of optimization studies which he is interested in, and that we too would like to have done. If funding agencies would support SRI research, we could surely move toward further improvement and refinement of recommendations.

Sue Edwards said that from the evaluations of over 900 farmers' fields over a period of 7 years, they estimate that compost fertilization by itself, compared to chemical fertilizer, gives yields about 30% higher. "We don't need forests to acquire sufficient biomass for organic fertilization," she said. "We need management." She described how farmers working with IDS in Tigray province collect biomass from the margins of fields, along roads and paths, etc. during the period from the latter part of September to October, before the rains. This has proved sufficient.

Sue also told the workshop about one elderly woman farmer working with IDS who has made her own innovations growing finger millet along the lines of SRI. She started with young transplanted seedlings, widely spaced, and provided the soil with plenty of organic matter. She had gotten an unprecedented yield of 7.5 tons per hectare. Sue said that, having learned about the

methods and mechanisms of SRI, she can now understand better the reasons for this woman's success. This was a nice lead-in to the next topic for discussion, so the workshop was adjourned at this point for a coffee break.

After the break, I gave a presentation on '**Application of the Principles and Practices of System of Rice Intensification to Other Crops.**' Indian farmers working with NGO or university partners have been extending SRI methods to *wheat*, with 16-40% yield increase, and 18% more straw in the first evaluations in Himachal Pradesh; to *sugar cane*, with 2-3 fold increases in yield, and cost reduction; to *finger millet*, with 2-3 fold increases in this crop in both Karnataka and Jharkhand states -- this crop is very important in Ethiopia; and even to *mustard* and to *cotton*.

Much interest, and some humor, was generated by my report on how Cambodian farmers have even applied SRI concepts to their raising of *chickens*, demonstrating another way in which more output could be generated from reduced inputs. The ensuing discussion before lunch was wide-ranging and covered both SRI for rice and questions about how these ideas and practices could be used more broadly.

Dr. Tilahun Amede, a scientist working on enhancement of livestock-water productivity jointly on behalf of the International Livestock Research Institute (ILRI) and the International Water Management Institute (IWMI), agreed that the methods described could certainly be useful to small farmers. But there was doubt whether they could be applied on a large scale, e.g., to mechanized rice production. I gave some evidence from SRI experience in India and China that these methods can be adapted by larger-scale producers and are not limited to smallholders.

A question was raised whether a reduced number of rice plants would have *sufficient leaf area* to give higher yield. This concern could be addressed by reporting on measurements done in 2003 at the rice research center in Indonesia which compared light levels within the rice field for plants with conventional spacing vs. wider SRI spacing. With normal bunching of rice plants together in a hill and then having hills only 10-15 cm apart, solar illumination within the canopy was so limited that the lower third of leaves did not receive enough light for photosynthesis. This means that instead of contributing photosynthate to the plant's supply, these lower leaves were *subtracting* from this pool for their own metabolism, which made them parasitic. Further, Japanese research has shown that it is the lower leaves that produce most of the photosynthate which supports the metabolism of rice roots. So, conventional crowding of rice plants not only inhibits their total photosynthetic activity, but it also reduces the energy supplied to their roots.

A question was raised whether SRI methods 'exhaust the soil' if it is not replenished with fertilizer. I responded that our experience with SRI indicates that the application of compost plus the increased exudation of carbohydrates, amino acids, etc. into the root zone from the larger root systems has the effect of enhancing soil fertility rather than depleting it. I discussed also the role of soil organisms in mobilizing or solubilizing nutrients such as phosphorus from the 'unavailable' reserves in the soil and making them 'available' in the soil solution for plants.

SRI is not necessarily an 'organic' production system; any nutrient shortages that develop or are found can be remedied by soil amendments. But so far, this has not been seen to be necessary.

While SRI methods can be used with chemical fertilizer, the best results have consistently been with organic fertilization. Sue Edwards endorsed this finding on the basis of ISD experience documented in Tigray province.

There was no disagreement from agronomists that organic fertilization is preferable if sufficient biomass (plant matter and/or manure) is available. The issue is really whether there is, or can be, sufficient biomass available to rely on organic soil amendments rather than fertilizer. In Ethiopia, where there are serious limitations on biomass, it is likely that most SRI practice initially will have to use fertilizer, or mostly fertilizer.

However, Sue Edwards said that from their Tigray experience, systematic efforts to mobilize and utilize organic material can be sufficient. This is written up in a booklet published by the Third World Network -- *The Tigray Experience: A Success Story in Sustainable Agriculture*, by Hailu Araya and Sue Edwards, 2006. It is always available as an FAO publication: <ftp://ftp.fao.org/docrep/fao/010/ai434e/ai434e00.pdf> Also, even if chemical cannot be totally replaced by organic fertilization, this does not mean that the promoting and use of compost should not be promoted and supported to the maximum extent feasible.

The last concern raised about SRI was its reputed labor-intensity. Dr. Tilahun noted that while there are perhaps ‘surpluses’ of labor at the national level, labor constraints are many and real at the farm level. I reported that our initial understanding of SRI as being more labor-intensive has not been confirmed by subsequent evaluations. In Madagascar, although farmers found that SRI increased their labor requirements at first, an evaluation published in the *American Journal of Agricultural Economics* (2004) showed that by the 4th year, SRI required 4% less labor per hectare, and by the 5th year, 10% less. In Asia, farmers have been quicker to make SRI actually *labor-saving*.

A research team from China Agricultural University studied SRI use in a village in Sichuan province, where 7 farmers used SRI methods in 2003 and 398 farmers used them the next year. The main reason that farmers gave for adopting SRI was its being labor-saving! In both this province and in Zhejiang province, where SRI was used on over 100,000 hectares in 2007, adoption is reported to be most rapid among larger farmers. Because with their adaptation of SRI methods, farmers are saving not just seeds, water and cost, but also labor.

Evaluations in Cambodia by GTZ and in Indonesia by Nippon Koei have showed SRI to be *labor-neutral* on average, meaning that while new SRI users require somewhat more labor per hectare while they are learning the methods, once these are learned, less labor is required than with standard methods. On the other hand, an IWMI evaluation of rainfed SRI in India documented an 8% *reduction* in the labor required per hectare (‘Productivity impacts of the system of rice intensification (SRI): A case study in West Bengal, India,’ *Agricultural Water Management*, 2007).

In Tamil Nadu state, when the Minister of Agriculture reported that there were 430,000 hectares of SRI production in the 2007 main season, he noted that the 50% average increase in yield was being achieved with less seeds, less water, and *less manual labor* (*The Hindu*, January 1, 2008).

So, although more labor time is usually required in the learning phase, in general we are finding that SRI methods can save labor as well as other inputs and can reduce overall costs.

After lunch, I gave a presentation on ‘**Soils as dynamic biological systems: Methods for enhancing soil fertility and restoring degraded soils.**’ This powerpoint presentation drew heavily upon a presentation made in October 2003 by **Dr. Olivier Husson** from the French international agricultural research agency **CIRAD** to a ‘soil health’ workshop that CIIFAD organized with several South African universities and held at Pietermaritzburg. CIRAD researchers have been working for 30 years in Brazil, Vietnam, Madagascar and other developing countries to devise farming systems that involve no soil disturbance – direct-seeding on permanent vegetative cover, or what some would call mulch-based agriculture.

Olivier had made a very good set of slides on the biological dimensions of soil systems which made my presentation more graphic and informative. He was one of the co-editors of and contributors to the book that I put together and published on *Biological Approaches to Sustainable Soil Systems* (CRC Press, 2006). In 2004, I arranged through CIIFAD for Olivier to spend a week in Ethiopia, visiting the Lenche Dima watershed and thinking about how CIRAD’s experience in other countries could benefit soil recuperation and regeneration in Ethiopia. (I can send Olivier’s report to anyone requesting it: ntu1@cornell.edu)

My remarks emphasized the value of thinking in term of ‘**soil systems**’ rather than talking just about ‘**soil.**’ The latter word refers, in most people’s understanding, to its mineral components, while reference to ‘soil systems’ underscores the importance of the air, water and *organisms* in the soil. These make it a functioning, productive system. More attention should be paid to the biological dimensions of soil systems as their inhabitants – bacteria, fungi, protozoa, earthworms, etc. -- perform many crucial roles in soil formation, functioning and fertility. (This is elaborated in the soil biology book, mentioned above, and in the powerpoint presentation, which will be posted.)

The presentation was well received, with no questions or comments challenging the points made. In fact, the presentation was based upon well-substantiated scientific investigations of how soil systems function, so it was not a matter of opinion. However, knowing what should be done is not the same thing as getting it done, or making it easy to do.

Dr. Tilahun agreed that it is desirable in principle to achieve all of these changes in management suggested by the CIRAD work. But, how can we get these changes adopted? How can we move from theory to practice? Ethiopia faces massive soil degradation, he said, with population growth pushing more and more households up onto hillsides where cultivation has very adverse impacts. While using crop residues for compost or mulch is certainly desirable, farmers have very great needs for fodder for their livestock, and all biomass has many competing uses. We agreed that any initiatives need to proceed pragmatically, taking farmers’ needs and constraints into account.

I suggested that up to now, only a tiny fraction of the resources that have been invested in studying and promoting inorganic fertilization, probably less than 1%, have gone into the evaluation and spread of ways that biomass can be better utilized for soil improvement. We know relatively little about how to produce biomass *more prolifically* on non-arable area, and

then how to collect, transport, process and apply it *more efficiently* to improve soil health, structure and functioning. The tools and implements presently used for handling biomass are mostly quite primitive and inefficient in terms of labor, unimproved for decades, even centuries.

Dr. Abera from SAA-Global 2000 said that we now know plowing the soil has negative effects, destroying soil structure, losing nitrogen and carbon to the atmosphere, and altering habitat for soil organisms. But this is done mostly for *weed control*. What can be done about this? This is also the main reason for flooding rice paddies when growing rice. I said that for rice we can control weeds and get the benefit of soil aeration by using the mechanical hand push-weeder I showed in my presentation. For field crops, weed control can be attained by herbicides, but it is more ecologically friendly to control weeds through *permanent vegetative cover*, through live or dead mulching, as seen from the CIRAD research I had show in the slides from Olivier Husson.

Building up the life in the soil is a kind of ‘no-till tillage.’ Soil organisms of many species and sizes improve soil structure and accomplish soil aeration by their creation of diverse-sized aggregates and soil pores. Dr. Abera agreed, commenting that SAA is promoting *conservation tillage* in various areas, where farmers grow cover crops and then kill them with herbicides. Then they just open a strip in the soil into which seeds are put. This saves farmers considerable labor because they need not plow the whole field, and it contributes to greater soil fertility over time.

There is an issue of how to protect grazing areas and hillsides which become compacted and denuded from overgrazing. It was agreed that *controlled grazing* with rotational access of livestock to certain areas in turn is a complement to conservation tillage. Such changes in animal management, however, require a participatory approach, where whole communities come to understand and accept the need for protecting vulnerable land areas from degrading use.

At this point, **Ananth** was invited to share his experience of introducing SRI in Kerala state of India. With many apologies he gave a short powerpoint presentation that went through the steps he and colleagues in the Mitraniketana KVK took to get SRI demonstrated and accepted there. “Even I did not believe SRI at first,” he said at the outset, having been taught by his professors at TNAU that 4-5 plants in a hill were the best way to establish a rice crop. He said that when farmers first transplanted tiny young seedlings far apart, people said that this looked “crazy.” Eventually, though, they saw the merits of this approach, Ananth said. He even brought the president of the local university and many extension agents to the fields to see for themselves, since words alone were not very convincing.

Ananth used the expression that I picked up from a prominent SRI farmer in Andhra Pradesh -- that SRI is “a root revolution.” In Kerala, at the end of the season, harvest festivals were organized for people to see the results. When harvested crops were evaluated, most of the yields were 6 to 7 tons per hectare, compared with 2.5 to 3 tons usually. The enthusiasm of farmers for SRI extension was such that the KVK took allocations from other program budgets to meet the demand for SRI support.

The workshop participants were at this point divided up into four groups by counting off: 1, 2, 3, 4, 1, 2, 3, ... After a coffee break they re-assembled in two groups on research issues, and two on training and extension. Then after 45 minutes, they reconvened in a closing plenary session.

The first group reported that they agreed that SRI is “an approach that needs to be extended,” though of course it needs to be verified on farmers’ fields. There should be research and further testing, but SRI is “not something harmful or unknown. There is no harm in getting farmers involved with it, and it is good for sustainable development. We don’t need to wait. Let us identify farmers with whom we can work. We should guarantee them that if their harvest is lower, they will be compensated; if they get more harvest, which we expect, that is theirs to keep. That should give good incentives.”

Trials can be on a pilot basis, to gain confidence and experience. Partners should be identified, from the Ministry of Agriculture, NGOs and others, from the federal level to regional level to local levels. Training needs to be done for extension agents and innovative farmers willing to give the new methods a try. Is this methodology applicable to other crops? It should work for any tillering crop, like teff, wheat, finger millet, etc., where wider spacing encourages more tillers, the group reported. “But perhaps not for maize.” (I commented in the discussion that one of the most successful SRI farmers in Madagascar has adapted the methods for maize successfully.)

The second group on research said that most participants agreed that this methodology has potential, but for what? Not for all areas, as there are some lands that have very low productivity, and are even barren, and we should not expect SRI to work even there. There is need to improve land productivity, as discussed in the third session. It is seen from experiments in Tigray that with lots of compost, yields can be improved.

There is already some research being done by SAA with teff along lines similar to those for SRI. The aim is to increase productivity and to avoid lodging, a major problem with teff. The plant dynamics should be fairly similar between teff and rice in this regard: SRI methods should help to improve teff performance. Tigray seems to be a particularly promising place for SRI initiatives because farmers there are already preparing and using compost. In general, the group thought this is a positive approach, but we need to generate more empirical data.

The third group had focused on training asking a series of question. Training for whom? For farmers, development agents, and higher officials. Local media should be used, as well as training of trainers. Why is there need for training? This is a new approach, so there is need for research, training and extension. What is the goal? Food security. Where should the training be done? Any place, as there is widespread need. When should it be done? Before their next cropping season.

The fourth group had also discussed research needs. It recommended that people who work in different organizations develop a joint proposal that could get appropriate funding to support research, particularly adaptive research. The objective would be to adapt global knowledge to local conditions. Which practices are applicable in different areas or for different kinds of farmers? This is not known. In particular, we need to look at the applicability – and the different practices – for upland and lowland uses of SRI.

Labor issues also need to be assessed, to know what are the benefit-cost ratios realized. The mechanical weeded recommended for SRI needs to be evaluated, as it may not be effective on

stoney fields or on sloping hillsides. Who should do the research? Basic research is suitable to students, especially PhD students, while applied research should be done by universities, NGOs, the Ministry of Agriculture, and others. As much as possible, it is desirable to follow a multi-disciplinary approach in SRI research.

This was all good feedback from the workshop participants. Sue and Satish led a discussion on forming an **SRI Alliance** to follow up the workshop deliberations. SAA has funds that can support some research, they said, and the Horn of Africa Center has funds for research as well. It is important to get the government involved particularly on the extension side. The HOA Center can facilitate seeking larger funding amounts from donor agencies once it is clear that there is a demand for this coming 'from the field.' It should also be possible to get funding from various donor agencies or embassies for capacity building. Satish mentioned the possibility of sending an Ethiopian delegation to India in December to attend the 3rd national SRI symposium being hosted in Coimbatore by Tamil Nadu Agricultural University. There Ethiopians could learn about experience with SRI from all over India.

Participation in the Alliance was tentatively constituted, with representatives from the Sasakawa Rice Program; the Ministry of Agriculture and the Ethiopian Agricultural Research Organization (EARO); the Amhara regional agricultural bureau which is involved with extension; the Institute for Sustainable Development, Oxfam America, the Forum for the Environment, another NGO participating in the workshop, and possibly other NGOs; the University of Addis Ababa and its Horn of Africa Regional Environmental Center; the World Food Program (WFP); PANOS, an association of environmental journalists; and the International Water Management Institute (IWMI). It was agreed that others could join or be invited as interest grows.

The first meeting of this group was set for the morning of September 18th, right after the Ethiopian New Year. To conclude the meeting, I presented copies of the book that I had put together and edited, *Biological Approaches to Sustainable Soil Systems* to EARO, the University of Addis Ababa, and IDS. Sue Edwards promised that the book will be put in the IDS library, to be available to anyone. With much good will, the workshop was adjourned about 5:30.

As we were gathering up papers and taking pictures, a young professional farmer, **Alemayehu Ali**, wandered into the workshop room, inquiring about the meeting which had just concluded. He said that he had seen the workshop banner hanging on the front of the hotel as he passed by and wanted to learn more about this System of Rice Intensification. After giving him a quick briefing, I gave him my three powerpoints on my memory stick. As Alemayehu downloaded them onto the laptop he carried in his backpack, he discovered three viruses on my stick, picked up during the day from others' sticks, and removed them. He was evidently as versatile with computer software as he is fluent in English (and Russian). While not a typical Ethiopian farmer, he is a serious agriculturalist who wants to learn all that he can about modern agriculture, and he was anxious to try out SRI. When his wife came into the room, having learned his whereabouts by cell phone, she and Satish recognized each other because she works with the biological garden that he is involved with for the Horn of Africa Center. What a small and coincidental world.

Follow-Up

Wednesday was a free day because some appointments initially planned fell through. This gave me time to work on this trip report at the guest house and to catch up on email through a webmail connection. Ananth came by in the afternoon for some discussion on planning next steps. That evening, Reddy hosted a fine Indian dinner for me with Satish and Ananth joining in.

Next morning Reddy took Ananth and me to see **Negusu Aklilu**, director of the **Forum for Environment** (FFE), an NGO with national scope. Negusu apologized for not having been able to attend the workshop on Tuesday but he wanted to be involved with the emerging SRI network. He explained that his organization is an advocacy NGO, with a membership base of 1,000, only 50 of whom are living in Addis Ababa. There are a dozen regional and local affiliated organizations which conduct local environmental audits, monitoring, and projects. They are very concerned with the adverse trends in environmental resources. When I explained more about SRI and about the possibilities for extrapolating these ideas and methods to other crops more widely grown in Ethiopia, Negusu said that FFE will participate in any collaborative effort growing out of the workshop.

FFE is a founding member of the Horn of Africa Environmental Management Network and has been working for several years with Satish, who had come from the university to join us. FFE is very well networked with the growing civil society movement in Ethiopia, and Negusu said that he will talk with relevant cabinet members about our discussion. There will be a national workshop on organic agriculture in November, to which he will invite me in case this could be fitted into my travel plans.

After a lunch at the Imperial Hotel, I was asked to give a lecture at the SRI SAI Learning Center nearby, on “*Post-Modern Agriculture: What It Could Mean for Ethiopia.*” About 15 students, mostly older ones came for the presentation (out of the 200+ students doing Master’s degree programs at the Learning Center in various subjects, mostly management). Only three of the students had training in agriculture, but all seemed interested in considering how trends in the 21st century – less land and water per capita, rising energy costs, growing environmental concerns, adverse climate change, etc. – might affect the viability and profitability of ‘modern agriculture’ as it was developed in the 20th century. Conditions are making agriculture that is large-scale, monocropped, land-extensive, mechanized, dependent on external inputs, energy-intensive, etc., less economically feasible and less environmentally defensible.

The advances made through Green Revolution technologies in the 1970s and 1980s have stalled, as per-capita grain production in the world has more or less plateaued since the mid-1980s, and total world grain production has not been increasing since the mid-1990s, according to data from FAO and USDA. There is reason to consider agroecological alternatives now, not necessarily as a substitute but rather as a resource-conserving, resource-efficient branch of agriculture, taking a different tack from that staked out by ‘modern agriculture.’ What we are learning from and about SRI is pointing toward the productivity and efficiency of agroecological approaches which could become ‘post-modern’ agriculture. This will not be moving backwards in time but rather moving forward, and it will be the most modern agriculture because it builds on advances in knowledge in the realms of biology, including microbiology, and in ecology, especially soil ecology.

The session went on for almost two hours, with some students lingering for extended discussion. One, who has agricultural background and is working in western Ethiopia with an NGO called **Messengers for Love**, was particularly interested in trying out these ideas with the communities where his NGO is active. He described a large area where the North Koreans introduced rice production during the 70s, when the military regime held sway. The farmers resettled there from the north, he said, are very determined and have continued with rice production since the Koreans left and their rice project ended. This NGO sounded like a good group to include in the SRI Alliance, to participate in evaluating SRI techniques for growing rice.

After a visit to the SRI SAI Consultant office near to the Training Center, we went to the Sheraton Hotel to meet with **Dr. Aberra Debarra**, State Minister for Agriculture, at 7:30. Unfortunately, when we got there, we received a cell phone call from him apologizing that he was still tied up in a meeting with a World Bank mission and would have to cancel the meeting. But he agreed to meet the next day, in the afternoon, with Satish and Ananth – and did so, expressing his interest in seeing SRI methods tried since rice is becoming a priority crop to develop for food security in Ethiopia. [They reported that this meeting was very positive.]

This contact and conversation cemented the collaborative effort which is now emerging in Ethiopia, with partners from the government, the university, various NGOs (both national and international), and the private sector. This is the kind of ‘four-cornered’ alliance that we have tried to forge for SRI in every country. Each sector can contribute to better understanding and disseminating the new concepts and practices according to its respective resources and comparative advantage. We will know in the months ahead how successful this initiative can be, and how successfully it can become ‘five-cornered’ by building in the active involvement of farming communities.