analysis.

The researchers of the local group, supported by WWF, completed the review of the second priority link Parbati-Kalisindh- Chambal. A stakeholder meeting was organized in November in Bhopal with local people from Madhya Pradesh, Chattisgarh and Uttar Pradesh, the areas which will be affected by these two links. Ms. Medha Patkar played a key role in mobilizing the local people to voice their opinions on the issue.

In the next few months, the committee needs to commission more work in the proposed link areas, and assess the data on ILR, which is now in the public domain. Assessment of the environmental impacts, assessment of impacts related to biodiversity, assessment of traditional water resources, assessments of the water balance for links etc., are some of the areas to be dealt with. The need of the day is for a stronger dialogue which gets integrated with the government's processing of consultation and reviewing of the project.

I was away for 3 months to attend a Training Programme of the British Council on Environmental Management and Sustainable Development at the University of Wales. Interacting with the environment practitioners from different sectors in UK and Wales and getting introduced to the processes of European Union for implementing sound environmental management practices, was quite an enriching experience. The course also gave me an insight into the working of UK's fully privatized water and sanitation services and the threats it faces from increasing water scarcity and climatic change.

I also had a chance to meet the Minister of Environment and Forests, The Government of India, who arrived at UK to sign the 'Sustainable Development Dialogue', which has been jointly taken up by the Government of UK and India. We discussed on WWF's work on developing a civil society dialogue on Interlinking of Rivers and how it can be made more effective.

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System of Rice Intensification (SRI)

Rice is an important food crop globally and it is a major crop in Andhra Pradesh. It contributes substantially to economy and livelihoods. In fact, rice cultivation is a major driving force for expansion of irrigation. More than 75% of irrigation is devoted for just this one crop in the state. So, any reduction in water consumption while improving the total production will have major benefits to people and ecosystems.

System of Rice Intensification (SRI) method has a potential to reduce water consumption and improve productivity. Dialogue project has established partnerships with Acharya NG Ranga Agricultural University (ANGRAU) and many civil society organisations to promote SRI while critically evaluating its potential through scientific research. More than 200 farmers have come forward to experiment with SRI in 2004 Rabi (second crop in the post monsoon). By and large, the results indicate the positive potential of SRI in saving water and improvement in crop yields, notwithstanding some constraints. This assessment is continuing with about 1000 farmers in the subsequent seasons as well to generate experiences in different seasons and agro-climatic regions. The partners who are participating in promotion of SRI and conducting scientific research have shared their experiences here.

New approach in irrigated rice cultivation

SRI method, a new management practice to reduce water use in rice cultivation, was identified to evaluate in farmers fields through farmer participatory approach during the last *Rabi* crop season 2004-05. At the end of the season, the field data was computed and analysed with the district reports

and the overall main report prepared. Subsequently, similar evaluation trials have been taken up in *Kharif* 2005 with 250 farmers in eleven districts in addition to six Rice Research Stations of ANGRAU. The rice crop is being harvested now and data collection process is in the advanced stages. The results of SRI method assessment in *Rabi* 2004-05 are presented below.

SRI method a hit with farmers

Deccan Chronicle, 8th Jan.2006

By OUR CORRESPONDENT

Anantapur, Jan. 7: The System of Rice Intensification Method of rice cultivation is slowly gaining popularity in the drought-prone Anantapur district which witnessed a decline in paddy yield in the kharif season.

As against a normal yield of 4,400 kilogram per hectare, the actual yield was around 2,500 kg per hectare in the district where the food grain was raised in an extent of 28,000 hectares in the kharif.

"The harvesting of the crop has begun in the end of December. The yield projections received from all over the district indicated a dwindled output," the agriculture assistant director Mr Salu Reddy told this correspondent.

In this backdrop there was a rise in the paddy cultivation through SRI method, which requires lesser water, lesser investment and gives greater yield.

The cultivation method imported from Madagaskar and Sri Lanka is highly remunerative. Any variety of paddy could be raised through the method which requires almost 50 per cent of regular input investment and which conserves a great deal of water.

The farmers who adopted the cultivation method got a yield of up to 67 quintals per hectare in kharif.

Though the method came into vogue in the State only two years ago, farmers have raised paddy by using the method in 2000 hectares in the current rabi in Anantapur district.

"A gap of 25 centimetres is maintained between each sapling of paddy in SRI method of cultivation. This facilitates greater aeration and absorption of greater organic material by each sapling. The only problem is that in the conventional method each sapling transplanted after it attain the age of 20 days. In th method the sapling is tran planted before it reaches days. Training would b given to farmers in raisi and maintaining the nur eries in this method," M Pothaiah, the agricultu joint director said.

River waters could b saved to a great extent if th farmers of command are adopted this method of rai ing paddy crop, he said.

WWF Dialogue project in partnership with ANGRAU conducted SRI evaluation trials in about 212 farmers' fields spread in Adilabad, Anantapur, Chittoor, East Godavari, Karimnagar, Mahboobnagar, Medak, Nalgonda, Ranga Reddy, Warangal and West Godavari, a total of 11 districts. The source of irrigation in these farmers fields varied widely like canal irrigation, bore wells, open wells and represented different soil types found in Andhra Pradesh.

Other initiatives

All the participating farmers were provided an initial training on SRI method and given a mechanical weeder, and a marker for transplanting. Besides the farmers' evaluation trials, WWF in collaboration with ICRISAT initiated a study on selected farmers fields in Andhra Pradesh to assess the soil microbial activity in the farmers fields practicing SRI. Apart from the collaboration with the university, WWF also initiated partnerships with several local NGOs and are conducting similar evaluation cum awareness SRI trials. To understand farmers' perspectives of this management method, farmers' evaluation of SRI was done in all the 11 districts. In this initiative, one farmer was chosen and he went to all the SRI trials in the district and evaluated these trials. A SRI manual in the local language was prepared and distributed among the farmers and other stakeholders. A video on SRI cultivation in the local language was produced and disseminated widely which is serving as a good source of training material.

Farmers' participatory evaluation of SRI

These trials were conducted on farmers' fields and managed by the farmers across 11 districts in Andhra Pradesh. Prior to the implementation, all the identified farmers were given training on SRI method of rice cultivation. Every farmer conducted these trials (land areas > 0.2 ha) preparing two plots with conventional method in one plot and the SRI method in the other plot. Farmers were asked to apply fertilizers, choose their preferred variety as per their own practice, and however use the same dose or variety for both the treatments. A field organizer for each district with the help of the concerned farmer recorded all the measurements and managed the trials in that district and other information was recorded through questionnaires. The yield data was statistically analysed using GENSTAT version 8.0.

Results of the trials

Adoption

Detailed study conducted in the SRI practiced farmers' fields revealed that careful transplanting, wider spacing, recommended water management practices, intercultural operations such as weeding, application of organic manures were followed by the farmers. The water management practices were partially adopted by most of the farmers and few could not maintain certain practices as alternate wetting and drying, standing water after panicle initiation. Management practices such as transplanting young seedlings (<14 days old) were partially (in many

Counting tillers of SRI Rice plants

districts less than half of the farmers) adopted, and the farmers showed a mixed reaction in adoption due to social factors like peer pressure and comments from neighboring farmers. Weeding by using a weeder, which is an important component of SRI package was partially adopted by a majority of farmers from several districts. The reasons were attributed to lack of skill and unwillingness of the labour force to operate the weeder as it requires hard work and additional force for operation. Technical improvements in the mechanical weeders need to be evolved to address this bottleneck. Application of organic manures that enhances the long-term soil fertility, is another management practice recommended in SRI package. Major reasons for partial and non-adoption was the non-availability of ready organic manures.

Most of the farmers adopted the set of practices partially and the preferences and degree of adoption depended on the local conditions of the farmers. Most important factor that emerged is that despite the partial adoption, varying degrees of yield improvement was observed. Certain externalities like irregular power supply in some locations emerged as a bottleneck for precise irrigation. Research investments in integrated weed control methods is crucial for the success of saving water in irrigated rice culture and preserving the rice ecologies through discouraging weedicide application.

Yield enhancement

The results of *Rabi* 2004 in Andhra Pradesh showed that without exception SRI yields were significantly higher (from statistical analysis) than the conventional yields in all the districts. Increase in grain yields were to a tune of 10.8 per cent in Adilabad district to 49.1 per cent in Ranga Reddy district. Farmers' trials across the 11 districts in Andhra Pradesh achieved an average of 21 per cent increase in grain yield. District average of SRI method of rice cultivation ranged from 4.9 t ha^{-1} in Warangal district to 9.5 t ha^{-1} in West Godavari district.

WWF - ICRISAT team participating in SRI paddy harvest

Only 7 per cent of the farmers reported lower yields (*i. e.,* 14 out of 186 farmers) got through SRI. The corresponding SRI yields for a majority of the farmers were higher than the conventional yields highlighting the point that not only the average yields of several farmers in a district but also a majority of individual farmers SRI plots obtained increased yields.

Water savings

Future rice production would witness a decreased availability of fresh water for irrigation and at the same time to meet the increased food demand by the ever-increasing population the total rice production needs to be increased. The fact that 60 to 70 per cent of irrigation water used in agriculture going for irrigating rice fields emphasizes that with less amount of water than currently available for rice production, more rice needs to be grown. Because of this, the existing methods of rice cultivation will not be able to produce enough to feed the growing population. In the context, SRI method of rice production follows alternate wetting and drying till the panicle initiation and thereafter a thin film of water is continuously maintained in the field and fits certainly as a water saving measure over the conventional system. The continuous standing water in the conventional method leads to increased percolation rates, seepage rates and evaporation. These unproductive losses can be minimized by the SRI method. To quantify comparative water use a careful experimental setup is required and work is in progress in this direction. Data from a published experiment from the neighboring state of Tamil Nadu shows that about 58 percent of water can be saved through SRI method of cultivation from transplanting to maturity. Qualitative information from our trials in Andhra Pradesh have also shown similar trends in water savings.

Constraints

Effective and timely weed control, which is a labour intensive operation, is the key to realize the yield advantages in this system. Farmers are facing problems with the mechanical weeders, lack of proper training for women work force for correct transplanting, non-availability of sufficient organic manures which are some bottlenecks in SRI. However, all these initial problems can be addressed through suitable interventions once the usefulness of this method is established. More important constraints are a lack of extension support system for this practice and non-availability of awareness campaigns. SRI is an evolving crop management method and further development through the research efforts and farmers participatory evaluations will lead to location specific management options.

Advantages

Due to the practice of alternate wetting and drying and negligible standing water up to maximum tillering stage, irrigation water savings can be achieved. Farmers saved up to 45 kg of seed per hectare by SRI method with no additional requirement of fertilizers. Most importantly yield improvements ranging from 10.8 per cent to 49 per cent were observed. This evolving crop management methodology can become one of the options to produce more rice with less water inputs. An investment in research is worthwhile to further develop and fine-tune them to cater the location specific needs. Potential bottlenecks like weeding, labor investments in weed management, land leveling techniques and precise control of irrigation at field level are to be addressed through further investments in research if water savings in irrigated agriculture has to become a reality.

Conclusion

It is often argued that we are approaching the yield plateau. To meet the future challenge of attaining a decent growth rate of rice production, we need to work proactively towards developing location specific integrated crop management technologies that would not only improve the yields but also at the same time reduce irrigation requirements and reduce the environmental costs. SRI is one such developing technology evaluated by the farmer's participatory methods in irrigated areas across the state of Andhra Pradesh in the dry season of 2004. Farmers showed varying degree of adoption of the components in SRI. Yield improvement varied from 10.8 to 48 per cent which was statistically significant in all the districts and less water was utilized The farmers felt many bottlenecks, like difficulty in weeding, lack of suitable mechanical weeders, training needs of unskilled women workforce etc. In essence it was shown that further investments in research to develop technologies like SRI would help irrigated rice cultivation to reach the goal of producing more with reduced water to meet the future demands.

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Enhanced biological activity in SRI fields

Developed in Madagascar by Father Henri de Laulanie in 1983, the System of Rice Intensification or SRI is a novel method of rice cultivation. It differs from the normal flooded rice in four ways: a) transplantation of 8-10 day old seedlings, b) wider spacing (25 x 25 cm), c) no flooding except for a short period after transplanting, but moist soil surface, d) use of more compost and less chemical fertilizers. Farmers are widely reporting substantially high yields from this method. Most researchers however are skeptical because they find it hard to explain the reported high yield levels (some above10 t/ha) without application of commensurate high rates of fertilizers.

An on-going study on upland crops at ICRISAT compares crop husbandry systems for contrasting sources of crop nutrients – bag fertilizers versus plant-biomass and microorganisms. We thus had indications that in the absence of bag fertilizers, microorganisms could play important role in crop nu-

trition, before launching this study. Soil samples from fields of 21 selected farmers out of about 250, growing SRI and normal flood rice (farmers' practice - FP) were collected and studied for microbiological, biological and chemical properties.Due statistical sampling procedures were followed for collections, and all samples from top 15 cm soil profile were evaluated for the following twelve parameters:

- Five soil-microbiology parameters, ie, total bacteria, total fungi, plant growth promoting bacteria, phosphate (P)-solubilizing bacteria and *Pseudomonas fluorescence*,
- Three soil-biology parameters, ie, dehydrogenase, microbial biomass carbon – MBC and microbial biomass nitrogen – MBN, and
- Four soil-chemical parameters, ie, total N, total P, available P, and OC%.

Mean population of different types of microorganisms in SRI and FP plots were similar except for siderophore +ve bacteria, which is one of the indicators of plant growth promoting bacteria. The population of the siderophore +ve bacteria was significantly (P=0.01) more (by 19%) in SRI than FP plots (4.2 $\log_{10}$ g^{-1} soil) at the final harvest. It may be noted that as per different published reports only 1 to 20% microbial diversity in soil can be cultured on laboratory media.

For the three soil biology parameters, data values that reflect both culturable and non-culturable microorganisms were generally more for the SRI plots (by 7 to 25%) than those of FP plots, both at the plant-growth and final harvest stages and the differences were statistically significant (P=0.07 or 0.05) for MBC and MBN at crop growth stage.

For the soil-chemical parameters, data values were also greater (by 2 to 23%) for SRI than for FP plots. These differences were statistically significant (P=0.07 to 0.01) for total N and OC% at vegetative stage and for total P at final harvest. There was no indication of nutrient depletion in soil of SRI plots despite the fact that all the 18 fields except one had more yield (by 12 to 55%) under SRI than the FP plots. Mean yield in SRI plots was 7.89 t/ha and in FP plots was 6.39 t/ha. But the yield differences were statistically non-significant, indicating large variability in the pattern and level of treatment differences across fields.

Bacteria Colonies on Potato Dextrose Agar (PDA)

Fungi on PDA with Streptomycin

The study was repeated during the rainy season of 2005, and is still ongoing. Available results suggest similar trends for microbiological parameters. Overall, the high yield in SRI plots seems influenced by the generally high biological activity recorded in these plots but there were no statistical correlations between the twelve different parameters and grain yield. More studies are underway to develop sustainability indices for a better understanding of the potential relationship between yield and soil properties. In these on-farm studies, inputs (such as fertilizers and farm-yard manure) used by farmers were not researcher controlled and varied across fields and across treatments in some fields. These inputs would have influenced data on the different soil properties discussed here and should be interpreted with caution. Some farmers were noted having difficulty in managing water in the SRI plots due to topography of the area. Researcher guided/managed off- and on-farm studies are needed for confirmation and for a better understanding on the widely reported high yield in SRI rice. Besides addressing the indicated weaknesses, further studies should also observe root-shoot development and photosynthesis in rice grown with the two widely different methods of cultivation.

Note: *Please see a poster on this study in the next page.*

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Microbiological Properties of Soil Samples from Rice Fields Cultivated using SRI Method

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Summary

- Mean data values of all the six microbiological parameters, except the population of plant growth promoting bacteria, were similar across the treatment plots of System of Rice Intensification (SRI) and normal flood rice.
- Population of siderophore producing bacteria (indicator of plant growth promoters) was significantly (P=0.05) higher in the soil samples from SRI than in control plots (4.2 $\log_{10} g^{-1}$ soil).
- Data values for three soil biology parameters (microbial biomass carbon, microbial biomass nitrogen and dehydrogenase activity) were generally greater for the SRI plots by 7–25% than for those of control plots, at both the crop growth and harvest stages of rice.
- Generally higher soil biological activity and population of plant growth promoting bacteria in the SRI than in control strongly suggests the important contribution of these traits to the reported high yield in SRI plots. More research to get direct evidence is warranted.

Objective

Microbiological analysis of the soil samples from the fields of SRI compared with conventional rice (control), to understand and assess their role in the substantially high yield reported for the SRI method.

Introduction

- SRI is a new method of rice cultivation developed in Madagascar by Father Henri de Laulanie in 1983 and shared widely from 1997 onwards (Uphoff 2004).
- SRI differs from the normal flooded rice in four ways: (a) transplantation of 8–10 day old seedlings, (b) wider spacing (25 x 25 cm), (c) no flooding except for a short period after transplanting, but moist soil surface, (d) use of more compost and less chemical fertilizers.
- SRI is advantageous over control for being high yielding, water saving, seed saving and for its low dependence on chemical fertilizers (Uphoff 2004).
- Evaluation of soil samples from farmers' fields growing rice with SRI and control for six microbiological (total bacteria, total fungi, siderophore producers, P-solubilizers, *Pseudomonas fluorescence* and culturable diversity) and three biological parameters (microbial biomass carbon, microbial biomass nitrogen and dehydrogenase activity) were the focus of the study in an effort to explain the reported high yield with SRI.

Field of SRI at crop growth stage.

Field of control at crop growth stage.

Plants from SRI and control plot at the age of two months.

Materials and Methods

- Twenty-one farmers growing rice using the SRI method were chosen for the study. Plots of conventional rice of the same farmers were used as control. Each farmer's field was treated as one replication, thus making 21 replications and two treatments, for data analysis.
- Three soil samples from three different spots of a given treatment plot were collected from top 15 cm and brought to lab in a thermocol box having ice at base.
- Appropriate dilution (ranging 10^{-2} to 10^{-4}) of each soil sample was plated on five different media for enumerating different types of microorganisms.

Bacteria were counted on Potato Dextrose Agar (PDA).

Fungi were counted on PDA with streptomycin.

Siderophore producers were counted on chromazurol-S (iron free) medium (CAS).

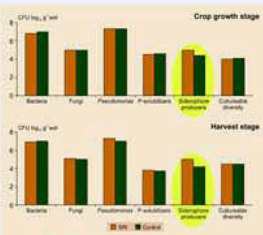
Pseudomonas fluorescent bacteria were counted on Pseudomonas Isolation Agar (PIA).

- Promising colonies with plant growth promoting (PGP) traits (P-solubilization, siderophore +ve, *P. fluorescence*) were picked up, purified and stored in a refrigerator for further studies.
- Isolates exhibiting two or three PGP traits were identified by growing each isolate on four different media: PIA for *Pseudomonas fluorescence*, PK for P-solubilizers, CAS for siderophore producers, Sucrose medium (SM) for *Azotobacter* like colonies.

P-solubilizing bacteria (PSB) were counted on Pikovskaya's medium (PK).

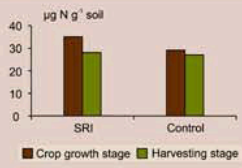
- All soil samples were also evaluated for microbial biomass carbon as described by Anderson and Domsch (1989), microbial biomass nitrogen through Jenkinson (1981) method and dehydrogenase activity as per Casida et al. (1977).

Results and Discussion



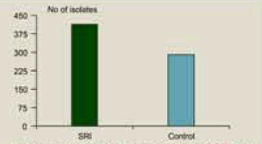
Microbial population in SRI and control.

- Population of total bacteria, total fungi, Pseudomonas and P-solubilizing bacteria, and culturable diversity were similar across the two treatments.
- Population of siderophore-producing bacteria was higher in SRI plots than the control, both at crop growth stage and final harvest of rice. The values were statistically significant (P=0.05) at final harvest.



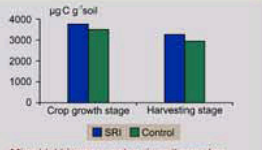
Microbial biomass nitrogen in soil samples from SRI and control plots at crop growth and harvest stages of rice.

- Based on mean, microbial biomass nitrogen (MBN) was more in samples from SRI plots (by 25% at crop growth stage and 7% at harvesting stage) than that of control, and the differences were statistically significant (P= 0.05 or 0.07) at crop growth stage.



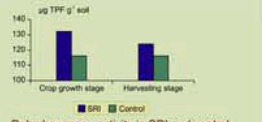
No of isolates showing two and/or three PGP traits.

- Of the 4081 isolates picked up for having at least one PGP trait, 704 had two to three PGP traits – majority (413) were from SRI plots (59%).



Microbial biomass carbon in soil samples from SRI and control plots at crop growth and harvest stages of rice.

- Mean microbial biomass carbon (MBC) was greater in soil samples from SRI plots by 7% at crop growth stage and 11% at harvesting stage than those from the control and the differences were statistically significant (P=0.05 or 0.07) at crop growth stage.



Dehydrogenase activity in SRI and control plots at crop growth and harvest stages of rice.

- Mean dehydrogenase activity was more in the samples from the SRI plots by 14% at crop growth stage and 7% at harvesting stage than those from the control suggesting more activity of microorganisms in SRI plots.

Conclusion

Soil samples from SRI plots generally had substantially high biological activity and population of plant growth promoting bacteria. Also, 18 of the 21 fields had substantially more yield in SRI than control plots. This does suggest a positive linkage between soil biological/microbiological parameters and yield, even though statistical correlation was lacking. More studies are warranted to understand these linkages.

References

Anderson JPE and **Domsch KH.** 1989. Soil Biology Biochemistry 21:471–479.
Casida LE. 1977. Applied and Environmental Microbiology 34:630–636.
Jenkinson DS and **Ladd JN**. 1981. Microbial biomass in soil. Pages 415–471 *in* Soil Biochemistry (Paul EA and Ladd JN, eds.). New York, USA: Marcel and Dekker.
Uphoff N. 2004. http//:ciifad.cornell.edu/sri.

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2 December 2005

WASSAN's initiatives on SRI rice cultivation

The Watershed Support Services and Activities Network (WASSAN) is an intermediary NGO providing valuable support to partners in promoting the SRI method of rice cultivation through the WWF Dialogue Project. Ongoing since the kharif season of 2005, partners for this endeavour include NGO networks such as the Indur NGOs Network (INN), Nizamabad, Anantha Paryavarana Parirakshana Samithi (APPS), Anantapur district; Mandala Mahila Samakhyas or Women Group Federations of Khosgi and Doultabad, Mahaboobnagar district; and Cluster Level Livelihood Resource Centers (CLRC), Parigi, Rangareddy district.

Support is extended mainly in the form of training, field demonstrations and handholding in the adoption of SRI practices and this will continue till the rabi or post rainy season of 2006. Resource material such as booklets on SRI practices, flexi charts and information brochures on organic solutions have been developed for dissemination. Several strategic initiatives have been taken up such as setting up SRI information centers, SRI demonstration plots, promoting organic solutions, designing and fabricating new models of markers and weeders, all of which can be crucial in propagating the SRI method.

SRI information centres

So far, two centres are operational in Mahabubnagar and Rangareddy districts that provide information and necessary technical inputs to farmers. The centres:

- Remain open from 6 am to 8 pm every day with a person on call.
- Direct farmers to the nearest SRI practitioners in the area for exposure or consultation.
- Receive applications for subsidised implements and follow these up with the agriculture department.
- Maintain an SRI-library with all published material, films etc. and demo-implements.

SRI demonstration plots

As of now, one demonstration plot is operational and more are planned. With one informed person on call, there are field demonstrations of nursery bed raising, transplantation and weeding. Groups of farmers are also trained if they express interest.

Organic solutions

Amruthajalam and *Panchagavya* are organic solutions, and alternatives to chemical fertilisers. Some farmers used these organic solutions in their kharif crops and reported good results. However, seeing that preparation of these solutions by individual farmers is difficult, the solutions will be made and distributed to farmers on a cost basis. The Women's self helf group in Kosgi Mandal started this scheme, and will also be replicated soon in Doultabad mandal, Mahabubnagar district.

Innovation on markers and weeders

A workshop on SRI implements was organised 12-13 July 2005. Anchored by WASSAN, the workshop, with the support of Center for Sustainable Agriculture (CSA), invited farmers, designers, engineers and mechanics to discuss the suitability of existing implements and make necessary modifications. Based on recommendations, WASSAN developed a marker and a weeder, which combines all the merits of existing types. So far 50 Mandava weeders and more than 35 markers have been distributed to farmers.

Apart from all this, data is being gathered from 425 SRI farmers to document SRI experiences and innovations.

Weeder & Marker - Critical implements for SRI

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A critical participatory assessment

The Centre for Sustainable Agriculture (CSA) is another NGO working to make agriculture productive, environmentally/ecologically sensitive and capable of preserving the social fabric of rural communities. CSA partnered the WWF Dialogue project during the last kharif season to assess the SRI method of rice cultivation in a participatory way and to understand its feasibility and potential.

CSA's studies and personal interaction with farmers revealed some areas that need attention, particularly with systems to supply implements that are SRI-appropriate. As of now, the Agriculture Department supplies the prevalent cono-weeder and cylindrical marker at 50% subsidy. The farmers use these as a rule and they are also deemed SRI-specific.

According to CSA's observations, however, there are a few problems:

- The cono-weeder does not function well in heavy, clayey soils; also, the quality of manufacture is substandard.
- The design of the machine makes local manufacture impossible and it is expensive in spite of the subsidy.
- Deposition of soil near the plant is not easily done with the cono-weeder while any mechanical hoe could do the job at minimal cost.
- The cylindrical marker suffers a similar disadvantage, but it is the only marker that is subsidised.

CSA and partner NGO, WASSAN, have developed a weeder called the Mandava that can accomplish the job better. At Rs 400-450, Mandava is cheaper and suits all soil conditions. It can also be easily manufactured by local fabricators, thereby eliminating chances of monopoly. If the government subsidy were to be extended to Mandava, it would even be affordable by peasants.

Practical difficulties

The SRI method requires some strict management practices and precision work, and farmers have been encountering several practical difficulties in adhering to them.

- A 1-cent seedbed is ideal for growing seedlings for one acre but farmers tend to prepare seedbeds that are 1/4th to 1/6th of a cent, which makes for unhealthy seedlings.
- About two-thirds of the respondents said they still had doubts over SRI's performance and suitability to their soils.
- About 50% said water management took a lot of their time and a majority complained about the availability and performance of the cono-weeder and cylindrical marker.

Transplanting young single seedling is a skilful operation!

Advantages with SRI

- 55 farmers out of 60 claimed they saved around Rs. 1500/-.
- Almost all of them said the incidence of pests and diseases had come down; 45 claimed not to have used any pesticide with SRI.
- Almost all of them were willing to expand area under the SRI method in the coming seasons and were prepared to advise other farmers about its advantages.

- All 60 farmers declared good tillering, good panicle initiation and grain count of more than 100 grains per panicle.
- All of them claimed some reduction in water consumption under SRI.
- 52 of the 60 farmers claimed an increase in yields by more than 10%.
- All of them used organic manure in addition to chemical fertilizer.
- In all cases, the seed rate was 2 kgs/acre as against the conventional 25-30 kgs/acre.

While SRI has definite potential, it is labour intensive, involves precision agriculture, requires innovations on part of the agriculturist and farmers have been reporting problems with existing implements. CSA will continue with a similar study in the next rabi season to assess adoption parameters.

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Dialogue with the Chief Minister of Andhra Pradesh

The efforts of the Dialogue Project to persuade the Andhra Pradesh state government to look for alternative options for water management outside of its mega dam-based irrigation policies have borne fruit; we met with great success in our dialogue with the Chief Minister of Andhra Pradesh on the adoption of the SRI method of rice cultivation. The government was convinced that SRI is an option worth pursuing if we are to reduce water consumption for rice, a major sucker of irrigation water in the state.

A multi-stakeholder dialogue was organized at the farm of a progressive farmer Mr Nagaratnam Naidu at Taramatipet near Hyderabad on November 15, 2005. The event was held to facilitate discussion on the viability of the SRI method among rice farmers and policymakers. The Honourable Chief Minister Dr YS Rajasekhara Reddy and the Honorable Ministers of Agriculture, Major Irrigation and Mining; scientists, policymakers, NGOs and media participated in the event. The information display included posters, photo and implement exhibitions that were put up by NGOs, government agencies and SRI farmers. While Dr Biksham Gujja of WWF moderated the dialogue process, the Chief Minister enthusiastically interacted with farmers to understand the merits and demerits of the SRI method from the farmers gathered.

PRADESH THE HINDU 16 NOV. 2005

YSR announces 4-cr. programme for popularising SRI method

World Wide Fund for Nature, ANGRAU take up pilot project

K. Venkateshwarlu

TARAMATIPET (RANGA REDDY DT): Bowled over by the success of the System of Rice Intensification (SRI), Chief Minister Y. S. Rajasekhara Reddy on Tuesday announced a Rs. 4-crore programme of training and having demonstration plots for popularising this novel paddy cultivation method in every village in the State. The Government will also think of supporting purchase of weeders.

Dr Reddy who landed right on the farm of G. Nagaratnam Naidu here, appeared pleased with the way paddy was raised using SRI method, held a tuft of freshly harvested crop and showed it to media persons. "We will leave no stone unturned in popularising SRI during the ongoing Rythu Sadassus".

The method being adopted by 222 farmers in 10 districts of the State under a pilot project taken up jointly by the World Wide Fund for Nature and Acharya N. G. Ranga Agricultural University involved water and soil fertility management, planting of seeds in a particular manner and weed control.

The crop raised used less of water and the yield was high. It had nothing to do with seed variety called "Sri Vari" as is being popularly perceived.

Interacts with farmers

Later Dr. Reddy preferred to sit down with the farmers who have adopted the SRI cultivation and heard them share their experiences. Mr. Naidu said under SRI, he planted only 2 kg of seed, used less water and obtained 92 bags of rice per acre. Balamanemma of Mahbubnagar, Varalaxmi of Anantapur, K.V. Rao of Guntur had similar success stories to narrate.

Dr. Reddy said the Government's campaign on discouraging farmers from going in for paddy in rabi was basically meant for conserving water for the coming years when the rainfall could be less. It was not for restricting free power supply, which would continue for the next four years.

Taking a dig at the previous Telugu Desam Government, he said a party, which was not able to supply power for ten minutes, was now finding fault with Congress Government's policy on free power supply covering 95 per cent of farmers.

Only income tax payees and big farmers having more than three pumpsets were being asked to pay charges. "This decision has the approval of farmers in all the 22 districts but TDP wants to support big farmers." The Government also encouraged farmers to go in for crop diversification for which Rs. 17 crores has been earmarked as subsidy.

Agriculture Minister, N. Raghuveera Reddy and Major Irrigation Minister, P. Lakshmaiah were present. Gujja Biksham, Policy Advisor, Global Freshwater Programme, WWF introduced the farmers and Vinod Goud project coordinator, WWF dialogue project spoke.

- 212 farmers implementing the method in 10 districts in the State
- It involves water and soil fertility management, planting of seed in a particular manner and weed control
- Discouraging farmers from growing paddy is meant for conserving water and not for restricting free power, says Chief Minister

BOWLED OVER: *Chief Minister Y.S. Rajasekhara Reddy harvesting a tuft of System of Rice Intensification (SRI) paddy at a farm in Taramatipet in Ranga Reddy District on Tuesday. Ministers N. Raghuveera Reddy and Ponnala Lakshmaiah are also seen.* – PHOTO: D. GOPALAKRISHNAN

The dialogue event was well timed, because the government had been considering banning rice crop cultivation for the rabi season under open/bore wells and tanks with a view to conserve groundwater resources. A few days earlier, the government had also announced its decision to cut off free power to rice farmers who continued rice cultivation with the conventional inundation method. The measures triggered off an uproar from farmers and opposition parties as well. Under these circumstances, encouraged by the success stories of SRI farmers at the dialogue meeting, the CM announced that farmers growing rice with the SRI method would get free power and their rice crops would be treated as irrigated dry crops. He also allo-

cated Rs 40 million and said the government would take up SRI demonstration plots in each village to train farmers. Implements such as weeders and markers would be supplied at 50% subsidies. He promised to gear up agricultural extension and the official machinery to promote SRI all over the state. The event received wide coverage in print and visual media at the national level.

This Dialogue meeting was instrumental in bringing about a paradigm shift in the cultivation of a major irrigated crop in the state.

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Restoration of small water bodies

Tanks, water harvesting earthen structures, are one of the oldest sources of irrigation and support many livelihoods in the semi-arid regions of India. Andhra Pradesh has the distinction of having the highest number of tanks, with the largest area under tanks. The Mid Godavari Basin has numerous tanks. But these tanks are losing their significance faster due to neglect by the government in favour of increasing emphasis on large irrigation projects. Dialogue project has developed a project in Warangal district on restoration of tanks combining social and ecological approaches to spearhead policy dialogues eventually towards major investments in improving tank infrastructure, not only in the state but also across the country. Three partners—one NGO (Modern Architects for Rural India—MARI, based at Warangal) and two research organisations (Institute of Social and economic Change –ISEC based at Bangalore and International Crop Research Institute on Semi-Arid Tropics—ICRISAT based at Hyderabad) have been involved to implement the project. The partners are narrating the progress they have made so far.

Tank deepening impact on wells in the command

Tanks restoration and management in the Mid Godavari Basin

In South India, earthen water tanks have played a significant role in sustaining livelihoods and ecosystems over several centuries.

Andhra Pradesh alone has about 76000 tanks, the highest in India. With the advent of major irrigation technology however, tank systems were neglected. Consequently, the economy and ecology were degraded. It has been established that the restoration of tanks can greatly help mitigate the agricultural and livelihoods crisis in rural India. Encouraged by past results, MARI planned for a micro basin approach in tanks restoration, and their focus was the Salivagu micro basin of the Godavari, in Warangal, Andhra Pradesh. Thanks to a one-year project grant to MARI took up tank desiltation work in 15 villages and also worked towards comprehensive tanks restoration in the entire micro basin. The project started in March 2005 with the Institute for Social and Economic Change (ISEC) and ICRISAT as collaborating partners.

Tank desiltation - Local people at work

In the summer of 2005, desiltation work was done in 12 tanks in the area, creating an additional 77,000 cu m of water storage capacity and enriching 1,486 acres of degraded drylands through tank silt application. In three tanks, desiltation was done manually and generated 2354 days of wage employment, in turn leading to significant reduction of labour migration. Community response to tank restoration has been phenomenal: of the total investment of Rs 5 million, the people have contributed about Rs 4.1 million. On an experimental basis, earthen mounds were constructed in about seven tanks to provide safe islands for birds. It's a feast to eyes to see nu-