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FARMING MATTERS

Small-scale agriculture for a sustainable society

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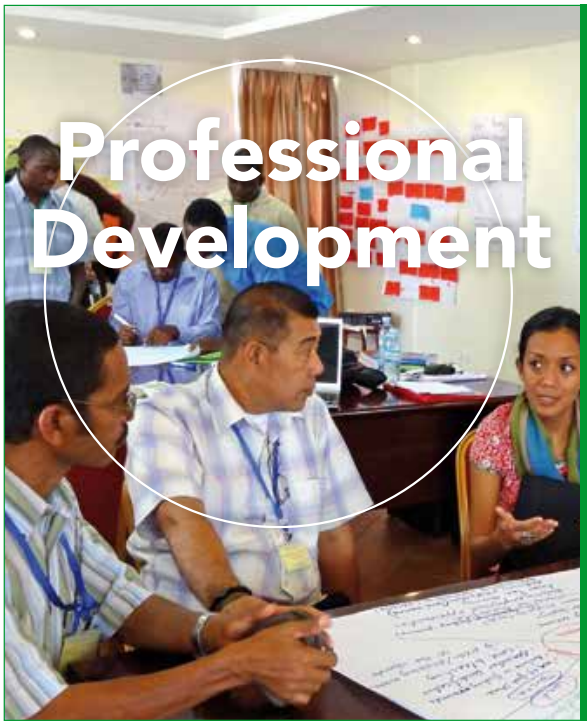
SRI much more than more rice

SRI 2.0 ▮ Learning from farmers
▮ Impressive results in Bihar



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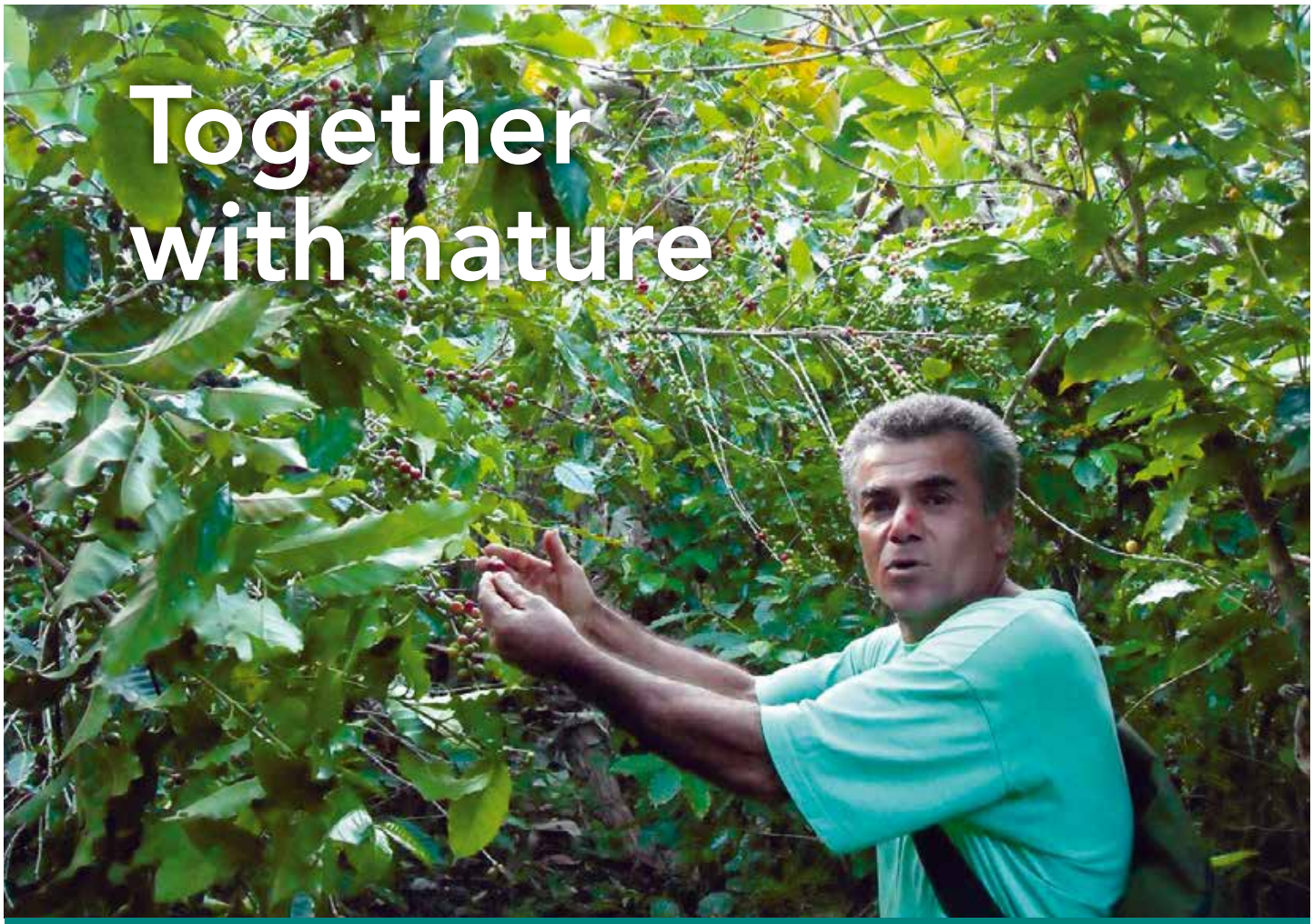
Together with nature



Geraldo Cândido da Silva, known as Dadin, lives with his wife Cida and their two children as farmers in the mountainous region of Zona da Mata, in the state of Minas Gerais, Brazil. Dadin played a key role in the creation of the farmers' union of his municipality, and since 1985 he has been working together with the Centre of Alternative Technologies, an NGO that develops projects in partnership with farmers in the region. Dadin's objective is to work together with nature. In their farm of around 12 hectares, he lets some native trees grow spontaneously, both around the house and in his agroforestry system. He also planted fruit trees alongside the coffee and bananas, such as avocado, papaya, graviola (*Anona muricata*) and jaca (*Articarpus integrifolia*), increasing the complexity of the system. The diversity of species on his farm not only benefits the environment but also contributes significantly to the family's income. Using no pesticides and almost no fertilizers, they produce so much fruit that is not possible to harvest everything. This is not a problem, as all that's left can help feed the soil and the local wildlife that comes to their farm. "It is a mutual relationship!" Dadin and Cida also raise pigs and grow a great variety of vegetables that are sold to the local primary and secondary school at a fair price, through a programme run by the national government. Both of them stress that their farm is about more than just production. Visitors can see the beauty of the landscapes, the care they put into the environment, and very importantly: they see that it is not only the plants that are healthy, but also the soil, the water and the people who are part of this agro-ecosystem.

Text: Heitor Mancini Teixeira
Photo: Centro de Tecnologias Alternativas

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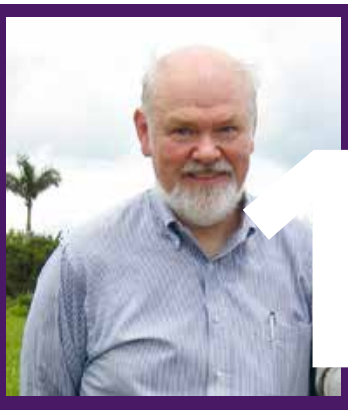

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"SRI is something unprecedented"

Norman Uphoff, Professor Emeritus at Cornell University, has been a fervent advocate of SRI for the past two decades. In an interview with *Farming Matters*, he reveals why he believes that SRI is a groundbreaking set of practices, why it still encounters opposition, and how more and more farmers are taking it up. Recognising that "we still don't fully understand it," his goal is "to get SRI evaluated and understood".

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Learning from farmers

Farmers in Nepal who have received training in the System of Rice Intensification do not always put all the lessons into practice. Instead they "shape" what they have learned according to their own specific context and interests. A look at this partial adoption led to a better understanding of the complexities behind farmers' decision making. This in turn has helped to break the traditional top-down extension approach, leading to stronger interactions with extension agents, and to better results.

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A visual guide to SRI

"Achieving more with less: A new way of rice cultivation" is a multimedia toolkit developed by the World Bank Institute on the basis of fieldwork carried out in the Philippines. The Institute's objective of "having something both informative and practical", as described by the Programme Leader of the Climate-Smart Agriculture Unit, is giving fruit: "this is the most viewed of our learning products. People from all over the world contact us about it."

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SCI: Planting with space

Farmers in Tigray, Ethiopia, are adapting SRI to other types of crops, anchoring these new practices in their traditional and local knowledge. These farmers, who regularly face the adverse impacts of climate change and unreliable rainfall, are growing finger millet seedlings and then "planting them with space". They are seeing positive results: less seed is needed and yields are higher.

AND MORE

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SRI sets farmers free

The story of the System of Rice Intensification (SRI) is an interesting one. It illustrates that relatively simple innovations can make a world of difference. It also shows that the transition to sustainable agriculture is a comprehensive social learning process involving many stakeholders – primarily farmers. Originating in Madagascar in the 1980s, SRI crossed the ocean to Asia in 1999. We are proud that our magazine was the first outside of Madagascar to publish about SRI, as early as 1999. Today SRI principles are being applied by millions of farmers in over 50 countries, contributing substantially to food security.

Many visionaries, pioneers and champions have worked hard to make this happen. For instance, Ms Manomani, a Dalit woman farmer in South India, realised bumper harvests on her two acres of SRI paddy fields and made national headlines. Dr Yang Saing Koma, an agronomist from Cambodia, received the 2012 Ramon Magsaysay Award, Asia's equivalent to the Nobel Prize, for his pioneering role in agricultural development, notably the introduction of SRI to Cambodia.

Knowledge networks and movements around the world, such as the Farmer Field Schools and agro-ecology movements, have also been catalysts in spreading in spreading SRI, showing their huge value in upscaling agro-ecological approaches. The main credit, however, must go to the millions of farmers who have adopted SRI, adapting and experimenting with it as they go along. They are now harvesting the benefits.

Yet, there are still policy makers and scientists who ignore the evidence of the success of SRI as they find it hard to open their minds to new ways of thinking, or prefer to hold on to vested interests. At the same time, multinationals are promoting a "rice intensification" approach which heavily leans on on the provision of external inputs.

Neither the cynics nor corporate interests can kill the spirit of SRI. It is a convincing example of how small-scale family farmers can develop sustainable practices independent of the research establishment and multinationals. "*For me SRI means* Merdeka (freedom)", said Pak Enseng, a small-scale rice farmer in Indonesia. "*I get a fair yield and am no longer dependent on buying seeds, chemical fertilizer or pesticides.*"

Edith van Walsum

Edith van Walsum, director ILEIA

3-week course on Design & Management of Interactive Learning in Rural Innovation from 4 to 22 November 2013, Wageningen, The Netherlands.

Targeted audience: Professional staff of extension and rural advisory services involved in linking relevant rural and agricultural stakeholders in joint learning and action-research programmes.

Objectives: The programme will enhance participants' competencies to facilitate, trigger and coach collective learning in rural innovation. It aims at strengthening the capacities of learning facilitators within the context of existing innovation processes, programmes, and projects.

Ahmed A. El Sherif, Marketing Officer Pro-Poor Horticulture Value Chains in Upper Egypt, participant in the 2012 course in Wageningen, states: "*This course empowers participants to move forward from theoretical knowledge to on-the-ground knowledge. I recommend this course to representatives of agricultural development agencies and grassroots organizations*".

A limited number of fellowships is available from the Netherlands Fellowship Programme (NFP) for nationals of certain countries. Application deadline: 7 April 2013
See http://www.icra-edu.org

Programme de 3 semaines "Concevoir et gérer un apprentissage interactif en innovation rurale", à Wageningen, Pays-Bas du 27 Janvier au 14 Février 2014.

Public-cible: Des professionnels des services de vulgarisation et de conseil agricole qui relient entre eux les acteurs du milieu rural et agricole dans des programmes conjoints d'apprentissage et de recherche-action.

Objectifs: Ce programme renforcera les compétences des participants pour concevoir, animer et encadrer un apprentissage expérientiel, interactif en innovation rurale. Son but est de renforcer les capacités des facilitateurs dans le contexte de processus, programmes et projets d'innovation existants.

"*Ce programme a été un déclic pour moi dans la compréhension des enjeux de développement pas seulement en milieu urbain. C'est un bon programme pour stimuler la réflexion et l'action.*"
Minata Coulibaly (Chargée de Communication à la FEPASSI, Burkina Faso).
Quelques bourses sont disponibles par le Netherlands Fellowship Programme (NFP). Dates limites d'inscription: 7 Avril 2013.

Plus d'information et le formulaire de candidature en http://www.icra-edu.org

Contact: icra@wur.nl

Education for change

Family farmers face climate change, limited water availability, rising fuel costs and unknown market opportunities, while their lands are coming under increasing pressure. They require access to information, and the knowledge that can help them deal with the complexity of the context in which they live. Most rural areas nowadays have access to some form of education. Nonetheless, the agricultural education system often has many shortcomings. Many get frustrated because the education available does not provide them with the answers they are looking for. Education rarely prepares youth for a future in agriculture and often encourages them to migrate to urban centres. Girls and women often don't have the same educational opportunities.

Many experiences are showing that agricultural education can do much more: it can be a powerful tool in strengthening the social value attached to farming. It can make people aware that there are low-cost and sustainable alternatives to "modern agriculture" which, for many small scale farmers, can be a route into debt and misery.

Clearly changes are needed at different levels – at vocational schools and agricultural universities, but also in informal and adult education initiatives and even at primary schools – so that education makes a positive contribution to agriculture. Agricultural educators – whether extension agents from public or private sector, university professors, school teachers or farmers themselves – need to become agents of change. They need to support farmers in the task of reconnecting to the agro-ecosystems that they manage, rather than becoming increasingly disconnected from them.

Issue 29.3 of *Farming Matters* will focus on the role of education in changing the mindsets of rural communities. We seek contributions that describe innovative education in rural areas. Who are involved? What is being taught? What teaching methods are used? What lessons are learned? And what makes these experiences valuable? We will also look at how educators prepare themselves for their job in a fast changing world, what their aspirations are, how the education system supports and how they connect with different stakeholders in the agricultural system, such as farmers and other value chain actors, fellow educators, researchers and policy makers.

Please send us your contributions! Articles for the September issue of Farming Matters should be sent to Jorge Chavez-Tafur, editor, before June 1st, 2013. E-mail: j.chavez-tafur@ileia.org

Farming Matters welcomes comments, ideas and suggestions from its readers. Please contact us via e-mail at ileia@ileia.org or write to P.O. Box 90, 6700 AB Wageningen, the Netherlands.

Riverside forests

When we talk about desertification, we should not forget the riverside forests. These have abundant native vegetation and should be recognised as areas of ecological importance – not only for the supply of organic material to the system, but also for other functions such as providing an area of refuge for breeding birds. They provide shade on the headwaters of the rivers, helping to maintain water temperature. But surely they are most relevant for the protection offered to the aquatic system, by acting as natural traps for retaining sediments and preventing nutrients from the soil from being washed into water courses.

Saul Leyva Chinchay, Empresa Azucarera Andahuasi, Peru

Farmer organisations

Thank you for dedicating a whole issue to farmer organisations! In the Netherlands there is an expression that says that organising farmers "is like trying to move a wheelbarrow full of living frogs". It is in farmers' nature to be independent and follow their own path, which makes it difficult for them to get organised. However, I like to see the positive side of diversity: with so many different passions and ideas, family farmers are more flexible, and this makes them well suited to farming in varying places and changing times. Strength in diversity is one way to unite family farmers: while highly specialised laboratory-like industrial farms perform well in single crop yields, family farmers are the absolutely winners when it comes to resilience, adaptability to markets and environments, and having a healthy diversity of farm products.

Klarien Klingen, co-ordinator Boerengroep, the Netherlands

Development 3.0

I am writing about the article on "Development 3.0" in the latest issue of *Farming Matters*. Honestly, I was surprised to read three European or North American men with comfortable jobs writing about farmers' realities. It seems like they do not recognise that much of what happens with farmers is also a consequence of positive government intervention – starting with roads, schools, electricity and other services that are highly valued in my region of Carchi, Ecuador. We should distinguish between a "theory of change", one that can be defined by the authors of this article, and a theory *for* change. We talk about how change happens, but we are deceived into thinking that this is the way we can debate and promote change. *Farming Matters* needs to get others to talk about this in the magazine. There are enough of them around the world!

Irene Torres, Fundación Octaedro, Ecuador

Biodiversity on farms

If 10% of a farm's land consists of hedges (windbreaks, trees and shrubs for harvesting berries, etc.,) and banks, this can increase biodiversity a lot, and provide many ecosystem services. This is because most of the biodiversity is found in the borders between forest and field, and between land and water. You don't have to have a forest to have a forest edge; and you don't have to have a lake to have a bank. Keeping animals as well as plants also increases biodiversity and good husbandry also increases farm resilience. I find that the more I learn about ecology and agriculture, the more obvious it becomes that biodiversity and farming are not opposites: as the Polyface farms in the US show, biodiversity makes farming more resilient, labour-extensive and productive.

Lucas Brouns, in response to the online debate on agriculture and biodiversity, www.agriculturesnetwork.org.

Land rights

From research carried out in some farming areas in Kitwe, it was discovered that people still lack information on land administration and boundary disputes in Zambia. As a result, many people have illegal settlements and go to the wrong people to acquire land. Even some civil society leaders do not know the procedure for acquiring land. This has caused a lot of disputes. One of the things we need to do is to continue educating small-scale farmers on land administration and other related issues. Empowering people by sharing knowledge on who the stakeholders in land administration are is a means of poverty reduction. This will require community meetings, radio programmes, etc. Land is the basis of many people's livelihoods, so depriving them of this valuable resource is denying them life.

Mpenza Kapata Mwanza, Zambia

SRI – A grass-roots revolution

However we look at it, the System of Rice Intensification, or SRI, is a major success story. Over the past decade it has helped millions of family farmers, notably in Asia and Africa, to improve their food security and food sovereignty. SRI methods simultaneously raise the productivity of the land, labour, water and capital employed in irrigated rice production. The approach is now being applied to other crops, such as wheat, maize, millet, sorghum, vegetables and tubers, and is proving equally effective. While the research establishment is still debating the relevance of SRI, more and more people are getting to know about it, and more and more farmers are practising it.

Willem Stoop and Edith van Walsum

SRI derives from the life's work of Henri de Laulanié, a French priest who worked with small-scale farmers in Madagascar. It is a fascinating case study of innovation from below. The idea developed completely outside the rice research establishment. It is a civil society innovation and has mostly been propelled by "champion" farmers, NGOs and farmers' organisations, supported by a significant number of people in universities, research institutes and international organisations. And although built on farmers' experiences, SRI also challenges the idea that the knowledge of farmers by itself can provide a foundation for further agricultural advances. The emergence of SRI shows that, for thousands of years, farmers have not been growing rice in the optimal way. SRI has come about through farmers' willingness to experiment with different approaches in co-operation with researchers and the results show the benefits of such experimentation.

The dissemination of SRI, from Madagascar to the rest of the world, and from rice to other crops, is equally fascinating. Early articles, such as Justin Rabenandrasana's "Revolution in rice intensification in Madagascar", were taken up by people like Ramaswamy Selvam, the current President of the All India Association of Organic Farmers and Narayana Reddy, a pioneer organic farmer from Karnataka, India. They took up SRI practices, came to view SRI as "the innovation of our lifetime", and took on the personal mission of disseminating it. Other farmers, extensionists and researchers began to champion SRI. The role these people have played in bringing SRI to the attention of others cannot be over-estimated.

Agronomic adaptations

SRI is not a fixed package of practices but involves a set of interdependent agronomic principles. It is a *system*, and scientists are now looking at the fundamental plant physiological processes that can explain the SRI phenomenon. The practice of spacing single plants more widely enables plants to create more and stronger tillers and roots and become much more efficient in their uptake of water and nutrients and in utilising solar radiation. The result is a crop that is more resilient to droughts, pests and diseases. Moreover, the combination of aerobic soil conditions and the use of organic fertilizer creates a favourable environment for interactions between roots and the soil's micro-organisms – a factor that has been seriously neglected by modern farming methods and research. These recent findings imply that SRI is not merely a "niche technology" whose relevance is limited to groups of poor smallholders. The spread of ongoing innovations that build on SRI principles shows its importance for family farmers around the world. It is obvious, however, that SRI requires adjustments in response to locational context and farmer-specific conditions. Thus *flexibility* is a key characteristic of SRI – and yet it is this flexibility that is

Ms Maya Aboudoulaye, one of the new SRI "champions" in Timbuktu, Mali. Photo: Erika Styger

often used to criticise SRI as a vague concept.

Interestingly, the plant physiological processes mentioned above can be used to develop a set of relatively simple agronomic guidelines on how SRI principles can be adapted to specific circumstances. These guidelines provide leads on how farmers can optimise these practices through simple experimentation.

Two paradigms

While many farmers, NGOs and scientists have embraced SRI, the rice research establishment is very slow in coming around to appreciate its merits. What is holding them back? It is more than a superficial difference in the interpretation of facts, it is about a clash between scientific paradigms.

One paradigm is based (often implicitly) on the thinking and practices that have shaped conventional Green Revolution research and development, which views knowledge as something developed in scientific institutions and passed on to farmers.

The other paradigm is grounded in the idea that technologies need to be developed and adjusted locally. Farmers are key actors – not just passive recipients – in this process of technology development, in which knowledge is jointly constructed by farmers and scientists.

There are huge vested interests behind the conventional paradigm. The seed and agrochemical industries and the actors associated with them have little to gain from processes that empower farmers and give them more knowledge while also reducing their dependency on costly inputs.

Breaking the barriers

Farmers show little interest in this debate. At the Global Farmers Forum in Rome in 2012 a year ago one Cambodian farmers' leader said: "We have experienced that SRI works, so why should we bother about scientists who do not believe that it works?" Yet, there are many other barriers to overcome. Traditionally, farmers sow their rice at high densities and after a couple of weeks the paddies appear reassuringly green. Understandably, farmers are initially alarmed when they see the early growth status of an SRI field. Farmers, as well as scientists, can experience a severe psychological barrier when first confronted by SRI methods as these undermine much of what they thought they knew. Good training and support of farmers, especially in the initial stages, is crucial for the success of SRI.

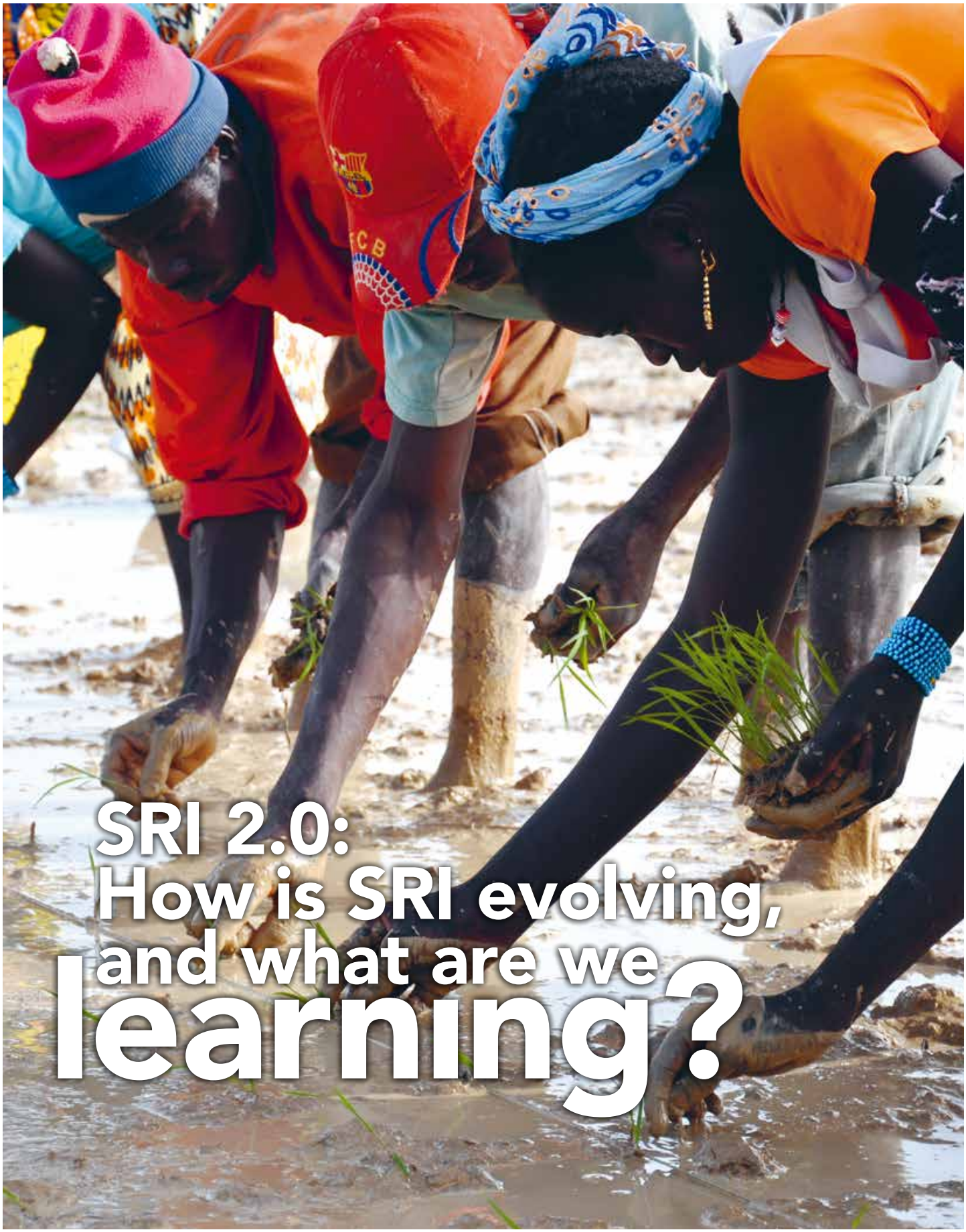
Equally important is the role of knowledge networks and movements around the world, which are catalysts in upscaling SRI and other complementary approaches. A strong synergy between many different actors, ranging from farmer champions to scientists and politicians with global influence, will help this grassroots revolution reach its true potential.

Finally, one exciting aspect of the still-unfolding SRI movement is that in today's world of electronic communication, new ideas spread fast, provided that they work. SRI may well be generating a shift towards a new scientific paradigm that focuses less on genotypes and more on phenotypes. This the more so since SRI principles are also shown to be effective for crops as diverse as sugarcane, finger millet, wheat and tef. These ideas may prove to be particularly beneficial in rainfed agricultural systems, which are the ones most vulnerable to future climate change related shocks.

Willem Stoop is an agronomist and soil scientist, having worked with CIMMYT, ICRISAT and the Africa Rice Center, WARDA. E-mail: willem.stoop@planet.nl. **Edith van Walsum** is ILEIA's Director. For a more detailed description of the guidelines for adaptation, read "Agronomic adaptations in SRI practices to meet farmers' conditions and needs" on our website.

SRI, a set of six interrelated practices

- Transplanting very young seedlings – between 8 and 15 days old – to enhance their potential for tillering and rooting
- Planting single seedlings very carefully and gently, rather than plunging clumps into the soil together, which can invert the root tips
- Spacing seedlings widely with gaps of at least 20 x 20 cm and in some cases even 50 x 50 cm
- Using a simple mechanical hand weeder ("rotary hoe") to aerate the soil as well as to control weeds
- Keeping the soil moist, but not continuously flooded, during the plants' vegetative growth phase, up to the stage of flowering and grain production
- Use of (preferably) organic manure or compost to improve soil quality



SRI 2.0: How is SRI evolving, and what are we learning?

Since the first successful SRI results outside Madagascar were reported from Indonesia, India and China in the year 2000, we can distinguish two major periods for SRI. The first period, referred to as SRI 1.0, lasted loosely from 2000 to 2008. The second is proving to be even more interesting.

Erika Styger

Curious extension agents, researchers and farmers who learned of SRI set out to determine if this method from Madagascar would show similar results in their own environments. Side-by-side comparisons were done mostly in farmers' fields and on a few research plots, where farmer practice or researcher best management practices were compared to SRI practices as described in the extension materials from Madagascar. The practices included raised bed nurseries, transplanting of young and single seedlings with wide spacing, application of organic matter to soil, alternate wetting and drying irrigation, and mechanical weeding to incorporate weeds and aerate the soil.

SRI 1.0: Curiosity, discovery and controversy

Based on their first field experiences, farmers and technical staff in different countries began to adapt the SRI practices to their own climates and rice growing conditions: ranging from humid to arid climates, from sea-level to high altitudes, and for irrigated, lowland and upland rice systems.

In many countries, excellent results were documented in research reports and field reports, as well as in a few scientific articles. This led to a period of controversy, when a handful of scientists from certain U.S. universities and the International Rice Research Institute (IRRI) questioned the legitimacy of the reported SRI yields and the associated benefits. Unless these results were validated in peer-reviewed scientific journals, the SRI system could not be taken seriously.

This observation about the lack of peer-reviewed scientific articles in this early period was correct, and understandable. More formal SRI research had just gotten underway. Formal agricultural experiments usually take 3-5 years from conception until results are published in a peer-reviewed journal, whereas technical reports can be available shortly after the field tests are finished. The number of peer-reviewed research articles increased steadily each year. Prior to 2002, fewer than ten articles about SRI were published per year. This increased to 15-30 articles per year during the period 2003-2008, and reached over 60 articles per year by 2011- 2012. As of early 2013, we count a total of more than 350 peer-reviewed journal articles about SRI.

Despite the greatly increased number of peer-reviewed journal articles, some observers, especially from scientific circles, have clung to their original objections, seeming to ignore the research and results published over the past decade. In any event, this intellectual controversy has been of little concern to farmers, who have continued to adopt the SRI method in more countries with support from pragmatic practitioners and scientists.

SRI 2.0: Adoption and innovation outpaces formal research

By 2008, the SRI method had been validated in 38 countries, based on solid fieldwork and research. Positive results were obtained under different rice-cropping systems independent of the variety used, and in different climates and agro-ecological zones. By early 2013, the SRI methodology had been validated

<< Transplanting the first SRI plot in Kouin, Mali.

Farmers gather to discuss the performance of rainfed SRI in Kalengakelu, Morogoro, Tanzania.
All photos by Erika Styger

Positive results, proud farmer. Mngeta village, Kilombero District, Morogoro region, Tanzania.

in 51 countries. Reports consistently cite yield increases, decreased use of seed, water and agro-chemicals, and increased income.

Although practices vary according to specific rice systems, the underlying core principles for SRI remain the same: (i) early and quick establishment of healthy plants, (ii) maintaining a low plant density to allow optimal development of each individual plant, (iii) enriching soils with organic matter to improve nutrient and water-holding capacity, increase microbial life in soil, and to provide a good substrate for roots to grow and develop, and (iv) reducing and controlling the application of water, providing only as much water as necessary for optimal plant development and to favor aerobic soil conditions.

Interestingly, it was resource-constrained smallholder farmers, who depend on agriculture and rice production to feed their families, who have been the most progressive in understanding the potential of SRI. To be able to change agricultural productivity based on their own resources and knowledge has empowered farmers and changed their outlook on what is possible in farming. In contrast to the conventional paradigm of agricultural intensification ("use more inputs to produce more"), farmers could now "produce more with less" – a real alternative and relief for many smallholder farmers. This has created a noticeable push for innovation. Farmers started experimenting in their fields with a fresh open mind, knowing that simple management practices can make all the difference.

Since the year 2005, farmers and technicians in India, Mali, Ethiopia, Nepal, Pakistan, Afghanistan and Cuba, inspired by their success with SRI, have begun – independently from each other – to test the SRI principles with other crops. Improved yields, stronger plants, and an improved quality of the harvest have been reported for crops like finger millet, wheat, sugar cane, mustard, Ethiopian tef, legumes, and vegetables. The application of SRI principles worked also with other crops, thus the System of Crop Intensification, or SCI, was established.

We can observe a similar trend with SCI as happened earlier with SRI. As of early 2013, no peer-reviewed scientific articles on SCI have yet been published, although field reports are available. The most complete collection can be found at the Cornell SRI-Rice website under "Other Crops". An example for wheat production in India illustrates this well. We are aware of on-station experiments for the system of wheat intensification (or SWI) at the Indian Agricultural Research Institute (IARI) in New Delhi and at the Indian Council of Agricultural Research (ICAR) in Patna, but no formal articles have been published to date. On the other hand, during the 2011/2012 season, more then 183,000 hectares were planted with SWI in the state of Bihar, achieving an average yield of 4.5 t/ha compared to the traditional 2.4 t/ha for that season.

Because innovation comes from the farmer, SRI and SCI turn the conventional research system approach upside down. It contradicts the still prevalent model where innovations are developed on research stations and "transferred" to farmers. With SRI and SCI, agriculture scientists need to go to farmers' fields to learn about the innovations. Unfortunately, this is not happening often enough, so most researchers, development professionals, policy makers and donors remain unaware of what farmers' innovations look like, and are thus unable to support new opportunities to improve food security.

So, how can we learn from these innovating farmers? Who tracks what they do and how is it reported? The press is often the first to make farmers' results public, as seen in many newspaper articles coming out of India. Still, for many field-based NGOs, reporting farmer SRI and SCI results in a systematic way is not a priority. They tend to focus on responding to donor-imposed monitoring indicators and requests for data, and if time allows, prefer to work in the field rather than writing additional reports.

A priority for research should therefore be to develop and implement methodologies that directly track farmer efforts and help to fine-tune their SRI practices and innovations. This can be done (i)

through an *action-research* approach, (ii) by designing "*natural experiments*" or "*observational studies*," under which treatments are not superimposed but data are collected directly from farmers' fields in a large enough sample size, enabling to track farmers' specific farming practices, and (iii) by training farmers and extension agents in data collection and scientific monitoring, enabling them to participate actively in research and directly share their findings.

How did experimental SRI research evolve?

While early research focused on comparison trials of SRI practices with farmer or best management practices, recently more research focuses on understanding the factors that contribute to improved plant performance and phenotype, such as studies of roots, plant physiology, and the influence of microorganisms on plant productivity. Much more research is needed to better understand "what makes SRI tick".

To date, most research on SRI has been undertaken by nationally-funded programmes, especially in India, China, Thailand, Japan, and Indonesia. International research organisations, including those of the CGIAR system, have done very little.

That institutions in several different countries have undertaken independent SRI research is a plus. Less favorable is that members of this diversified research community tend to work in relative isolation because there is no easy way for them to collaborate, and valuable opportunities for synergy are lost. In order to address these constraints, at SRI-Rice we are developing an international SRI research network, where researchers can connect and collaborate easily with each other through an open-access internet platform.

Integration of agro-ecological approaches

Rethinking how we produce agricultural crops is more pressing than ever, given the fragility of our finite natural resource base, and the threat of climate change. The (New) Green Revolution paradigm, "producing more with more inputs", is no longer an option.

Ecological approaches for sustainable agriculture intensification still offer much potential for development. With the accumulating evidence that the application of SRI core principles improves productivity not only for rice but also for other crops, the potentials for using the SRI methodology become broader and more relevant.

There is still tremendous opportunity to further integrate the SRI method with other ecological approaches such as conservation agriculture, integrated pest management, and agroforestry, to name a few. Each of these approaches concentrates on a different component within the farming system. Their integration will help to create diverse, healthy and productive farming systems with an improved resilience under a changing climate.

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More information is available at the SRI-Rice website, including an inventory of articles (http://sri.ciifad.cornell.edu/research/journalarticles.html). Readers are invited to become a member of the International SRI Research Network at: http://www.mendeley.com/groups/1178631/system-of-rice-intensification-research-network. The official network launch will be mid-2013.

Moses Kareithi, the first SRI farmer in Kenya.

Harvest in Thai Nguyen province, northern Vietnam.

Crazy? Not at all!

Although hardly enough to meet the national demand, rice yields in Peru are high, reflecting an apparently efficient production system. Working together with other farmers, and not always with the national research and extension system, farmers' initiatives are showing that a much more efficient way is possible.

Divar Moya Zavaleta

"Not only have I spent less money on water and seeds; I have also seen much higher yields."
Photo: Divar Moya

I have been growing rice since 1998, on my own farm at Fundo Santo Tomas, approximately 600 km north of Lima. This is in the Lambayeque-Chancay valley, one of the rivers that cross the desert coast of Peru. Rice is one of the main crops in this area, which benefits from the presence of one of the largest water reservoirs in the country. Average yields in Lambayeque are around eight tons/ha.

In 2004 I came across an old magazine that included an interview with Angel Fernandez, a Peruvian researcher. There he spoke of SRI and of its many advantages, referring to examples from different parts of the world. Intrigued, I asked every extension agent I met, but they all said that it was impossible, and actually silly, to try transplanting young seedlings at larger distances, or to think that rice could be produced with less than the recommended 10,000 m^3 of water per hectare. I met Ing. Fernandez in 2008 and asked him to come and talk to us, so I organised a seminar that was attended by 75 of my neighbours. This lecture, together with information he brought from Cuba, convinced me to try SRI in my fields in the 2008-2009 season.

My neighbours immediately called me "loco", or crazy, for trying to change what apparently is an efficient system. But the results have been surprising, showing that the traditional way of growing rice is not so efficient. I needed only 6,500 m^3 of water per hectare, saving 35% of the amount that I would normally use. Instead of the 80 kg of seed regularly needed, I used only 6 kg. It is true that I needed more help, especially for transplanting the seedlings and for weeding. But these extra costs have largely been covered by the additional income we have seen. Not only have I spent less money on water and seeds; I have also seen much higher yields. Since 2009, my fields average the equivalent of 15 tons/ha.

Who's "loco"?

I was convinced that these results would be more than enough to convince all my neighbours, yet this has not been the case. One of the factors behind this may be that most of them are older, and therefore less willing to try new ideas (or less willing

Ensuring high-quality seedlings. Photos: Agro-Corporación COMFIA

to go to the field quite so often, and see what is actually happening there). Most importantly it seems that up to 90% of rice farmers in Lambayeque depend on other "pieces" of the production chain for their decisions: those who sell inputs, those who provide credit, or those who buy the produce. We all find it hard to acknowledge that, even before we sow the seeds, they own the production process – and try to resist changes in the field. Equally sad is the lack of interest by the local authorities, most of whom hardly ever go out to the fields. They are even telling us that we should stop producing rice, as this should only be done in the Amazon region of the country, where more water is available.

Yet, I am making money, and I plan to continue doing so. Last year we started adding compost to our fields. I am saving even more money by not buying fertilizers, and my idea is to start selling organic rice soon. We are also trying some small hand weeders which make this task less cumbersome. And I am interested in improving our irrigation system so as to be even more efficient. I was told that farmers in Brazil are using sprinklers, and am curious to see if this would work.

Getting together

Fortunately, I am not alone any more. Together with some of my neighbours, we have started a small company, which we hope will help us to continue innovating. The objective of Agro-Corporación COMFIA is to provide the necessary inputs, like seeds, and to produce rice seedlings. We are starting with a small nursery where we aim to produce enough seedlings for 20 hectares. We would like to get financial support from one of the different government programmes aimed at small scale farmers, but we are not waiting for this to get going. We are convinced that this is not a crazy idea at all – and are sure that more farmers will join us.

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"SRI is something unprecedented"

Norman Uphoff, Professor Emeritus of Government and International Agriculture at Cornell University, served as director of the Cornell International Institute for Food, Agriculture, and Development (CIIFAD) from 1990 to 2005. During this time he became acquainted with the System of Rice Intensification (SRI) in Madagascar, and realised that "something unusual was going on" as farmers were obtaining average paddy yields of eight tons per hectare instead of their usual two tons. Recognising the huge potential benefits, he has been working ever since to promote the testing, evaluation and understanding of SRI. "People can overestimate my role as easily as they can underestimate it… the truth is that the actual work has been done by thousands of people around the world."

Interview: Jorge Chavez-Tafur

Described more than ten years ago in *LEISA Magazine*, the number of farmers practising SRI has grown enormously since then. "I think that SRI is something unprecedented, as very few innovations before have shown such a huge productivity windfall. And just as surprising is the fact that we have been able to proceed on such an international scale with so little support and so much opposition."

Why is SRI so special? More than producing rice, we're talking about a different way of working with farmers, involving both technical and social dimensions. The two are put together. SRI is not a technology that can be put into a box. It is a set of ideas and experiences, a set of relationships and a set of values. This is often really hard to get across, especially to agronomists or to economists who want consider SRI as "only this" or "no more than that". It should be kept in mind that the original objective of *Tefy Saina* in Madagascar was not just to grow more rice, but to help the rural people understand their situation and take the opportunity to improve it. While SRI was intended to help people produce more food, it was also expected to help them "liberate" themselves from unfounded beliefs or social pressures.

Are its benefits being recognised? Unfortunately, there is still resistance from some sources, and some scientists still use controversy over the highest yields obtained with SRI to avoid facing up to the much greater average high yields which farmers get. Yet it is clear that things are changing; for example, there is now an SRI page on the website of the International Rice Research Institute.

Aren't there still missing explanations? It is true that we still don't fully understand all the agronomy behind SRI. But there are more than 300 published articles on SRI by now, so a lot is now known and has been validated. It has also been surprising to learn that SRI ideas and practices can be successfully extrapolated to wheat, finger millet, sugarcane and other crops, even recently to elephant foot yam. In Bihar, India, the first farmer trials with this root crop have given yields of 100 tons, whereas farmers usually get 20-30 tons, and best management practices from the university only reach 60 tons… Something is going on that promotes more photosynthesis and carbohydrate production, and greater yields across many crops. This is so different paradigmatically that a lot of people are simply not buying it.

Shouldn't scientists be interested in learning what this "something" is? Absolutely, and I spend much of my time trying to get scientists in various disciplines to become involved in such research, even if this is, for many, a hard sell. Fortunately, more and more researchers are showing interest, and we are starting to work with more microbiologists, which is great, because I don't see any way to understand the results that we are seeing in the field without paying attention to microbiology. Our minds are used to the macro, but there are millions, billions, trillions of micro-organisms involved in the soil, in plants, even in our own bodies. We are starting to understand how essential microbes are for human health and growth. The same applies to plants. What we are seeing is that the plant is not a little machine, to be redesigned and controlled entirely by us, but rather a system in symbiosis with billions of other organisms. SRI focuses on farming practices, dealing with seed quantities, spacing, water, labour, etc., but at the same time, it is about a shift in paradigms. Unfortunately, the latter is much harder to write about; we don't yet know enough about it; and it puts off many agronomists who don't want to question what they think they already know.

Are there other factors involved? It may be that SRI is not moving faster because there are no commercial interests behind it, although we have seen SRI promoted by grain millers in Sri Lanka and India (as SRI paddy has fewer unfilled grains, thus less chaff, and the grains do not break as easily during milling). With the adoption of

Farmers, researchers and local officials gathered in front of a signboard in the Tien Tai township, Zhejiang province of China, posted by the China National Rice Research Institute to publicise SRI demonstrations in Bu Tou village. Photo: Lin Xianqing

SRI there can be some losers, such as those who make a living selling seeds. It has taken some time for donor agencies to accept and promote SRI, maybe because their success is too often assessed by how much money is spent and SRI reduces rather than increases capital requirements. But the biggest benefit of SRI is for farmers, as it allows them to reduce their costs and become more independent. I like to think, as a social scientist, that the most interesting aspect of SRI is its farmer-centred and farmer-driven approach. Sometimes SRI is presented as a recipe; but I prefer to regard it as a menu. Unfortunately, it has been very difficult to change the focus of extension programmes from promoting input use to presenting ideas. Many extension agents have been trained to push agrochemicals, seeds, fertilizers or machinery. But SRI is not about inputs; it is about ideas. And this is hard for many to accept, even for some working with very innovative NGOs. SRI involves a paradigm shift.

Is there a change in the way researchers work with farmers?

I like to highlight the "triangular model" developed by Merrill-Sands and Kaimowitz. This is very different from the standard "linear model" of technology development, whereby scientists do the thinking and farmers are expected to adopt what extension agents tell them. Researchers, extension agents and farmers are more effective when positioned in a triangular relationship, interacting with each other. In such a model, extensionists are facilitators and catalysts, and communications flow back and forth in all three directions. This triangular model represents what we see in SRI fields. Innovation can come from any one of the three partners. SRI is not only a farmer-led process; a lot of improvements have come from and continue to be developed by extension professionals and by researchers. This triangular model helps us to better understand what we're seeing in the field, and also helps us recommend stronger interactions.

Comparing the roots of three conventionally-grown plants (left) with the roots of a single SRI rice plant (right) in the village of Kulubari in the Indian state of Tripura. Photo by Marguerite Uphoff

These interactions are also helped by "champions"...

Champions, advocates, proponents, catalysts, they come in all shapes and sizes, and all of them are "sticking their necks out" and playing very important roles. These are individuals who are all different, with different histories, but who share a common denominator: their interest in working for the benefit of farmers, consumers and the environment. Some have a political agenda, others are apolitical, but all are interested in farmers' welfare. And they all share qualities such as being able to work up and down within the system, from capital cities to farmers' fields. This is what I saw in Cambodia, where those promoting SRI were able to talk equally well to ministers as to farmers. One of the major advantages that we have had is the initiative of these champions. Another good thing has been that a lot of farmers have become advocates themselves, spending their own time and money to promote, defend and spread SRI. I was persuaded of SRI's merits in the early 2000s when I met and talked with two remarkable farmers, one in Cambodia, Mey Som, and another in Sri Lanka, H.M. Premaratna, both of whom had trained several thousands of other farmers at their own expense. If farmers are willing to train others, in their own time and with their own resources, then it must be beneficial.

Aren't you also a champion?

After three years of seeing small-scale and poor farmers around Ranomana National Park in Madagascar getting four times more yield, on soils that some US agronomists considered some of the poorest they had evaluated, I thought I needed to learn enough French to read Father de Laulanie's papers and enough agronomy to communicate with agronomists about what we were learning. Something was going on, and nobody was promoting it. It sort of fell to me to try to inform and mobilise people, to invite universities to do research, to approach donor agencies, and to make SRI visible outside Madagascar. My aim was not to promote the use of SRI as such, but more to get its methods and results evaluated, by both scientists and farmers. If they liked the results, they could take them and use them however

they liked. Surely it helped that I was based at Cornell, that I enjoy writing and editing, and also was travelling and meeting practitioners in many countries. Like the champions I mentioned already, I like to spend time with all kinds of people, with farmers, PhD students, research directors and policy-makers. I know that my directness has not always been appreciated and that my arguments and evidence are "controversial" in the eyes of many. Some have said that I am too passionate, and I have learned that most scientists don't like passion. But passion has nothing to do with the truth of the matter. My goal has been to get SRI evaluated and understood. To get to the truth, let us study it.

Isn't there an obvious need to look at what farmers are doing? Certainly, farmers have been growing rice for thousands of years. However, we should not assume that everything that farmers do is optimal. Our SRI experience shows that, for thousands of years, farmers have been ploughing their soils too much, have flooded their fields too much and have planted too many seedlings, wasting water and seeds and lowering yields. And millions of farmers must have seen that the rice plants in the upper portions of their fields, which are better drained, were growing better than those in the lower parts of their fields. Farmers should have figured out that it is better to use fewer seeds, but didn't. So let us respect farmer knowledge, but let's not idealise it or accept it uncritically, forgetting that there can be gaps or serious misunderstandings. For many different reasons, farmers also do some suboptimal things – just like researchers or professors do.

Do you see more communication and exchange among farmers once they start using SRI? This is another aspect that we should be looking at, and measuring if possible. Both in Cambodia and in Mali, for example, colleagues have mentioned to me that farmers who became engaged with SRI also became more interested in sharing their results, and in working together, leading to greater levels of collective action and social capital. The evidence so far is anecdotal, but I don't dismiss it. We have also seen the emergence of self-help groups, for example, in the state of Bihar, India, where women who are now using SRI and SWI (SRI ideas applied to wheat) are co-operating to improve their households' welfare, and are improving their families' future by requiring that members' daughters go to school. The government of Bihar has been wise enough to work together with local NGOs, and the results are tremendous, extending beyond agriculture to social benefits. Households are gaining access to credit, there is more local employment, the drudgery of women's labour is reduced, local ecosystems become healthier; SRI has fuelled many other processes beyond better rice production.

Narayana Reddy, frequent contributor to LEISA-India, explaining his experience with SRI at his homestead farm in Maralenanahalli village, Karnataka, India. Photo: Krishna Prasad

So what's next? At our first (and so far only) international conference on SRI, held in China in 2002, we decided to proceed along two parallel tracks: scientific research and extension activities. This was different from the usual strategy where science is done first and extensionists spread whatever scientists recommend. SRI has been proceeding with a "walk on both legs" approach; but extension has moved ahead faster, and the science is only now catching up. I'd like to see SRI being addressed across many disciplines, by soil science and plant breeding, but also economics, sociology, communications, etc. We are trying for SRI to converge with other agro-ecological approaches such as conservation agriculture, organic farming, IPM, and agroforestry. And we are getting more private sector involvement with SRI. There are 4 to 5 million farmers, most in Asia, using some or all of the recommended SRI practices. But it is only a matter of time before this doubles to 10 or 20 million, and then to 50 to 100 million and more. As the results keep spreading and accumulating, any remaining scientific opposition will become quite untenable, and more and more governments and donors will support the spread of this knowledge and these opportunities

For more information, please visit the *SRI-Rice ONLINE* website (http://sri.ciifad.cornell.edu) or write to Norman Uphoff directly. E-mail: ntu1@cornell.edu

Learning from farmers

It was an afternoon of 2002 when I first read about SRI. As an extension officer in the District Agriculture Development Office (DADO), I started promoting SRI in the following years in the district of Morang, Nepal. Over this time I observed hundreds of attractive SRI fields and spent some years as a SRI activist. Looking at the results, I've learnt that different farmers face different problems, and that they adapt all techniques to suit their diverse circumstances and needs.

Rajendra Uprety

The media and local "champions" have played a vital role in promoting and disseminating SRI in Nepal. In 2004, SRI was introduced in Morang with the specific objective of increasing yields. DADO used the Farmer Field School approach to train a range of farmers in SRI techniques; trainees included land owners, share-croppers and farmers leasing land, and farmers with a variety of water sources. During the interactive field meetings, SRI seemed compatible with the reality of the region's resource-poor farmers, the scarcity of fertilizers and their use of different rice varieties. Yet, through working with these farmers over a period of time, researchers and extension staff learnt that their agro-ecological and socio-economic contexts often differ, and that the newly learnt SRI strategies are applied differently, according to context.

The demand for rice has been growing in Nepal because of population growth and the purchasing power of part of the population, and helped by better transport facilities. Rice has become a government priority. However, the very same social and economic changes have also led to new income opportunities for people in the rural areas, and as a result the cultivation of rice is less attractive. Although the majority of the farmers continue to grow rice to secure their household's food needs, they are also involved in other agricultural and non-agricultural income-generating activities. The new generation of farmers is more interested in high-value vegetables, fruits and cash crops.

A detailed field study in Morang in 2008 showed that SRI does increase rice production, but its adoption was limited. The reliability of access to water, the distance between the house and the field, land ownership, and the availability of labour and training were the main factors determining the farmers' strategies, and hence influencing the dissemination of SRI. Having an unreliable water supply, farming in swampy lowlands, or cultivating rice on rented or distant fields, were all obstacles to adopting SRI. Most SRI farmers used the family as a source of labour, whereas most large-scale farmers, depending on hired labour, were not interested in SRI as its labour requirements are time-bound. Overall, the determining factor was the perceived importance of rice production within the farmer's wider range of agricultural and non-agricultural income-generating opportunities. This study suggested that rice intensification was only attractive to a relatively small portion of land-owning rice farmers with a low dependency on hired labour.

Harvesting time: farmers' knowledge and aspirations are the best determinants of success. Photo: Rajendra Uprety

Variations in field management

Yet we also saw that farmers employed different field management strategies to incorporate SRI into their farming systems. Few farmers used all six of the SRI practices introduced in the training sessions (young seedlings, single seedlings, wider spacing, alternate wetting and drying irrigation, mechanical weeding and use of compost). But these modified methods appeared to be even more successful than the "standard" SRI system, producing an average yield of 5.7 tons/hectare. By maintaining regular interactions with the farmers, researchers and extension agents learnt what works and what does not. We found that the farmers with most productive fields used younger and fewer seedlings of photo-insensitive varieties, spaced wider apart. The type of land and the availability of water greatly influenced which approaches the farmers chose.

A majority of farmers only used SRI methods in the higher parts of their field. Farmers used younger seedlings in areas where irrigation and drainage can be controlled better, responding to the evidence that transplanting young seedlings in water-scarce areas is more risky. Water availability also determines the timing of land preparation and transplanting. When the rains are late, or when water is not available, the preparation of the field is delayed while the seedlings continue to grow in the seedbeds.

Secondly, mechanical weeding appeared problematic. Although farmers used fewer seedlings and wider spacings, they were not laid out in the straight lines or square patterns necessary for mechanical weeding. Weed management, manual or mechanical, requires sufficient and skilled labour. Mechanical weeding was found to produce higher yields, but most of the farmers complained about the inefficiency of locally-made weeders. The heavy equipment was not suitable for the predominantly female workers.

Third, many farmers did not follow the advice to use compost (alone or with fertilizer). Sometimes there was not any (or enough) compost available, especially as dung is often used as fuel. Other factors that constrained the use of compost included the distance to the field, land ownership, and the expected yield returns. The use of bullock carts in the area is in decline, limiting farmers' transportation options. Moreover, farmers prefer to apply the available compost on high-value crops such as vegetables and spices. Another notable finding was that the poorly producing farmers in the study area used more fertilizers than required. By contrast, the farmers who had attended the training sessions had reduced their fertilizer use.

Finally, we saw that farmers did not follow the recommendations of the national research systems. Only 22 percent of the rice fields in Morang were planted with the recommended varieties. In well-irrigated (and thus less vulnerable) areas, the recommended varieties performed better and were adopted by farmers. But they were less popular in the more vulnerable fields. In addition, the low straw yield of the recommended dwarf varieties makes them less attractive for farmers who have animals. They prefer the taller varieties which also provide straw that can be used as fodder. Also, while long-duration and low-producing Basmati varieties were grown by some farmers due to the high price they fetch, they were not popular among small-scale and marginal farmers, who cultivate rice for home consumption. The most popular varieties were not recommended by the research system, but had been selected and disseminated in farmer-to-farmer networks.

Learning from farmers

The introduction of SRI during the DADO training sessions helped both farmers and extension workers to learn from the rice fields and from each other. Extension workers saw that their own recommendations were not followed, and started a process of reviewing the techniques with the farmers. This broke the traditional one-way deliverer-recipient system of learning. After joint trials and learning, mutual interactions became more common. Such interactions helped re-shape the general recommendations of the extension staff. When DADO began making recommendations based on farmers' suggestions, other farmers became more interested in testing and disseminating the new approaches.

SRI was found to be effective – but not necessarily interesting for all farmers and all contexts. Farmers tried to re-shape it according to their agro-ecological and socio-economic conditions, choosing some of the practices best suited to them and their particular fields. This taught us, as an extension agency, to rethink our technology dissemination process for medium and small-scale farmers, and begin providing them with a set of options. These options are intended to be varied and flexible enough to allow farmers to choose from them according to their particular situation.

If the government and other supporting services want to increase the benefits that farmers can get from SRI techniques, they need to address the issues that influence farmers' decisions. Improving water distribution systems and their reliability can be beneficial for farmers with fields in lowland, swampy or poorly irrigated areas. Another option is to help farmers to access more suitable mechanical weeders. Nutrient management strategies can also be improved by looking at the supply of fertilizers and by providing intensive training on the use of manure. We constantly try to keep in mind that a training package needs to be designed according to local needs. And the production of rice needs to become an economically attractive alternative to other sources of income.

Farmers' knowledge and livelihood aspirations are the best determinants of success in the field. This study found that farmers are the best selectors of varieties: participatory variety selection and dissemination approaches are clearly the best strategy to introduce promising rice varieties. A diversity in varieties and cultivation methods is an essential component of rice farming. Especially in countries like Nepal, where the majority of rice farming is still rainfed, it is important to understand and appreciate the agro-ecological and socio-economic diversity of rice farming systems.

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Working together with farmers, we all saw what works and what not. Photos: Rajendra Uprety

Women: the primary link

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The "miracle" solution to famine currently being promoted by the New Green Revolution for Africa is based on the intensive use of external inputs such as fertilizers, pesticides and genetically modified seeds. Unfortunately, despite the existence of these technologies, nearly one billion people in the world suffer from hunger and malnutrition. More than three quarters of them are family farmers in developing countries. In sub-Saharan Africa, agriculture is practised by the majority of the rural population. It is the main source of income for more than 80% of the inhabitants of the Sahel. Nevertheless, they face food insecurity. Family farmers who cannot produce enough to feed themselves do not have money to buy additional food. They are farmers, but they lack the power to influence policy decisions on agriculture. How can we make sense of this?

These inputs are expensive, but not necessary. Better local solutions exist, that are able to ensure food security and strengthen the resilience of small-scale farmers to climate change. These solutions, which fall under the umbrella of agro-ecology, include mulching, natural pest management, and using local seeds and organic manure. Such approaches are affordable, adapted to local ecosystems and have demonstrated their ability to improve the food security of communities while preserving their natural resources.

Women play a vital role in this landscape. They are central to African agriculture: they do more than 70% of the work on the land, and are responsible for almost all processing activities. In times of crisis, women ensure the survival of their families by developing coping strategies to ensure their families are fed. They are the primary link between production, consumption and nutrition – for their children and, indeed, the whole family. And they demonstrate that the use of agro-ecological practices is paying off. We have recorded testimonies of large numbers of women, heads of households or not, who are capable of feeding their families and covering their children's school fees. Thanks to their perseverance, these women have been able to increase their yields, and are now producing enough food.

The need to provide support to such innovative women farmers is evident. But some fundamental questions remain. Do we understand clearly enough the roles of rural women farmers? How can we provide women with strategic support that can enable them to influence agriculture policies? It is crucial to start developing answers to these questions so that we can spark a shift in resources and invest more in ecological agriculture. This will support the rural people in West Africa to work towards truly sustainable livelihoods.

Unity for Diversity

Beyond higher

Enhancing agrobiodiversity

A key goal of the joint Hivos/Oxfam Novib Knowledge Programme, Agrobiodiversity@knowledged, is to share knowledge and experience about farming practices from all over the world that use and enhance agricultural biodiversity. The System of Rice Intensification (SRI) is usually promoted as a successful approach for increasing productivity and decreasing costs. The Centre for Indian Knowledge Systems (CIKS) has demonstrated that SRI can also contribute to the conservation and wider dissemination of local and indigenous rice varieties, with positive outcomes for both farmers' livelihoods and biodiversity.

S. Subhashini, K. Perumal, K. Vijayalakshmi and A.V. Balasubramanian

India is home to a vast array of wild and cultivated crops. Over the past 50 years, as a result of the Green Revolution, high-yielding seeds have been increasingly selected for their responsiveness to the application of fertilizers. The consequences of these selection priorities have been felt all over India. In the state of Tamil Nadu, as in many others, farmers have realised that they were losing the indigenous paddy varieties, which previously offered them a wide array of advantages such as resistance to pests, diseases and drought.

Multiple advantages

As in India as a whole, the state of Tamil Nadu has a growing population while the total farming area is diminishing. Over the past seven years, CIKS has been conducting research at various levels to increase rice productivity. Amongst other things, we have been promoting SRI, convinced that it can help increase productivity and decrease costs for paddy cultivation. Our experience, however, has shown that SRI can also contribute enormously to the conservation of indigenous rice varieties.

One of the reasons why the use of SRI has been taken up by a large number of farmers in this region is because they are able to see direct and immediate benefits, even if they are only "partial adopters". A short field survey run by CIKS showed that only 7% of SRI farmers fully followed the different principles; 57% were "medium adopters" and 36% "low adopters". Our survey also found some of the reasons behind these different adoption rates. As awareness levels were initially low, many farmers considered the large spacing in between each plant a waste of space, and feared that crop growth in the nurseries was not appropriate. Farmers also mentioned that, in general, there is a lack of skilled labourers in some villages for transplanting at the right time. The additional labour required discouraged many farmers, especially when time was short.

Yet there has been little disagreement about the overall benefits of SRI. In all cases, SRI showed higher yields: those of the "full adopters" went up by 30-35%. Those of the "medium adopters" went up by 15-20%, and even when adoption was "low", farmers saw their yields increase by at least 10%. Apart from higher yields, another main advantage is that the approach requires the use of far fewer seeds. Moreover, since the seeds are initially sowed in nurseries with appropriate spacing between each other, there is less risk of getting the varieties

yields through SRI

mixed up if it rains immediately after sowing. Additionally, since there are fewer seedlings, they can be handled more efficiently. The farmers are therefore aware of the purity of the seeds, and it is easier to select good quality seeds manually, which was not always the case in the past. Lodging takes place at a later stage than when grown with conventional methods. Consequently, the earheads form properly, and it is therefore possible to spot and remove admixtures of other varieties in the field itself. Moreover, the water requirements are low, which implies that several varieties can be planted in the same season. As a result, more seeds can be produced and saved every harvest – contributing enormously to the conservation and wider dissemination of local and indigenous rice varieties.

CIKS' Seed Bank Programme

The Centre for Indian Knowledge Systems has been working for the past 20 years to set up seed banks in villages across Tamil Nadu, as a way of promoting a more sustainable agricultural system. Our programme aims to identify important traditional seed varieties and, together with farmers and all members of a community, promote their conservation and use. We soon realised that SRI could be a key component of these efforts.

Our work is showing how the cultivation of these varieties serves to enhance the security of small-scale and marginal farmers' livelihoods. As part of this programme, a large network of farmers is exchanging seeds and information and seeds are being stored in community-level seed banks. Members of these seed banks are using part of their land for growing different varieties. CIKS provides them with an initial supply of seeds, and we discuss the necessary steps to manage their production organically. At the end of the season, farmers have to return twice the quantity of seeds they were initially provided with. The following season, these seeds are given to other farmers. This has a multiplying effect, and over time the community can manage the seed bank independently.

Our work has shown that the establishment of a seed bank programme can help increase the availability of local or indigenous varieties of rice and many other crops. Working together with CIKS, farmers are showing that this has immediate benefits. When CIKS first started, there were only a handful of indigenous varieties left. We work in villages where farmers grow 130 varieties of paddy and 50 varieties of indigenous vegetables in their fields and experimental plots. Farmers who are producing SRI rice seeds in an organic way have reported yields of up to 5.5 tons/hectare. These are now doubly certified (as organic and also certified by the Government's Seed Certification Department), and can therefore be sold at a higher price. It is thus not surprising that SRI is described as a "very handy innovation".

S. Subhashini, K. Perumal, K., Vijayalakshmi and **A.V. Balasubramanian**. Centre for Indian Knowledge Systems, CIKS. E-mail: info@ciks.org. For more information about the programme, please write to **Sarah Doornbos**, Knowledge Officer, Agrobiodiversity@knowledged. E-mail: s.doornbos@hivos.nl

The benefits are easy to see: evaluations and group discussions. Photos: K. Vijayalakshmi / CIKS

Adoption and adaptation

Between 2004 and 2010, the *Groupe de Recherche et d'Echanges Technologiques* (GRET) supported the introduction and dissemination of SRI in Myanmar's Northern Rakhine State, as part of a series of projects aiming at ensuring food security. Based on this initial experience GRET started to introduce the System of Rice Intensification in the Ayeyarwaddy Delta in the aftermath of Cyclone Nargis. Working in a new setting and context, the overall results were different – but no less interesting.

Pierre Ferrand and Hla Min

With more than 800,000 inhabitants, the Northern Rakhine State is one of the most densely populated areas of Myanmar. Situated on the western coast of Myanmar and bordering Bangladesh, it remains one of the least developed parts of the country and suffers from low income, poverty, malnutrition, and poor infrastructure. A high proportion of the population is made up of small-scale or landless farmers who can only partially meet their household food needs. Farmers lack information and marketing options, and inputs, such as seeds and fertilizers, are unavailable. SRI seemed like a good option for meeting our overall objectives of increasing rice production and supporting the most vulnerable farmer households.

An evolving methodology

During the first two years, GRET introduced SRI with demonstration plots, open field experiments and the use of incentives. Our objective was to convince farmers of the advantages of SRI and to increase the number of participants in the Farmer Led Experiments implemented by the project (see box).

Our strategy changed after the 2006 rainy season as, although more and more farmers seemed convinced by the approach, the total acreage under SRI cultivation remained low. This meant providing the tools needed by farmers and paying more attention to training and supporting local groups. We started working with farmer facilitators, organising six technical meetings per season, focusing on aspects such as transplanting, weeding and harvesting. We found out that the availability and price of the iron rotary weeder promoted by the project was one of the main obstacles to adoption of SRI, so we worked to design a new weeder which was not only lighter but also more affordable.

After four years, we could see the results of our work in the fields of many farmers. Having worked with up to 5,700 farmers, a brief assessment showed that 18% of the summer paddy farmers in the area were practising SRI, with 9.3% of the area's total acreage being cultivated in this fashion. SRI produced higher paddy yields than traditional farming practices: yields were about 700 kg/ha higher soon after the beginning of the project in 2005, and up to 1.4 tons/ha higher in 2007.

Trying out a direct seeder for summer rice. Photo: Pierre Ferrand

Results and lessons learnt An impact assessment carried out at the end of 2008 showed that about 80% of the SRI users wanted to continue practising SRI in the next season. We also found that half of all SRI users had modified the recommended techniques according to their specific conditions, a clear consequence of the approach we followed, and of the farmers' engagement in the participatory action research process.

Unfortunately, GRET left the area in 2010, and because of restrictions and limited accessibility it was not possible to continue monitoring the situation. Yet we could talk of a "critical mass" and a "self-dissemination point". As a result of our strategy, we were able to reach a large number of farming households in the area, regardless of their status. This led to a thorough and sustainable dissemination of SRI. The clear advantages of SRI were another factor: farmers were especially interested in SRI as yields increased, and because a smaller amount of seed is needed. The need for labour was not a hindrance to the uptake of the technique, as labour is plentiful in the area.

Based on the experience gained in Northern Rakhine State, GRET was convinced that SRI could be beneficial in other areas too. After the damage caused by Cyclone Nargis in May 2008 we decided to work in the Ayeyarwaddy Delta, fully aware that this region has different characteristics.

Into a new area The Ayeyarwaddy Delta is a rice growing area with thousands of acres of rainy season and summer rice. Summer rice was introduced

Extension approaches

In both project areas farmer facilitators played a key role in reaching out to more farmers, both during training sessions and support visits. In both cases, they were an important part of the Farmer Extension Groups and of the Farmer Led Experiments. Our training sessions were built around demonstration plots, with a group of farmers gathering regularly during the season to focus on the main challenges in the field. Each demonstration plot was no larger than one third of an acre, in order to be easily manageable but still big enough to work as an on-site experiment. Training handouts were prepared by GRET agronomists and provided to each farmer at each session.

The Farmer Led Experiments were run by those already involved in a Farmer Field School or a Farmer Extension Group, and who wanted to continue experimenting with new practices on their own plot under the guidance of a local expert. Usually, the issues covered were proposed by the farmers themselves. Exchanges between individuals were a central part of this approach, and meetings were organised regularly. The plan was to build a participatory and long lasting process at the grassroots level, with farmers setting their own experiments and learning from each other. The provision of inputs was kept at a minimum in order to ensure ownership and the sustainability of the process.

From experiments to "customised versions".
Photos: Pierre Ferrand / GRET

in the early 1990s and then spread to practically all the rice fields where fresh water is available. It is cultivated with early-maturing varieties, and it yields twice as much as local varieties of rainy season rice. However, after more than a decade practising the same crop management (including broadcasting more than 300 kg of seed per hectare), farmers were suffering from the cumulative effects of pests and diseases and soil degradation, and were also vulnerable to price fluctuations. The impact of Cyclone Nargis in the area only added to these difficulties.

GRET decided to introduce SRI, relying first on demonstration plots and farmers who act as contact points, and then supporting the formation of Farmer Extension Groups. Special attention was given to the local production methods and context, and to the farmers' major concerns, such as the availability of seed and the fertility of their soils. Starting in the 2009 summer season, our project targeted experienced farmers with an interest in trying out new practices. The SRI principles were discussed with farmers in awareness meetings. Farmers were selected to host the demonstration plots, where farmers experimented with early weeding, transplanting young seedlings, shallow transplanting, and the use of fewer seedlings per hill.

The total amount of seeds used in all the demonstration plots was significantly lower than normally used (an average of 115 kg/ha). And the harvest records showed that yields were not lower than those obtained with the conventional practices – although they were also not higher. As in other areas, we saw that certain conditions needed to be met. In the Delta, farmers broadcast a high amount of seeds as a way to suppress the growth of weeds. The farmers had no time to tend the nurseries, nor for transplanting the young seedlings, especially as the farmers here manage large areas. In addition it was difficult (and expensive) to find skilled labour for transplanting the seedlings.

More results, more lessons learnt

In 2010, the harvest records of the farmers we were working with in 37 different villages showed positive results, both with local varieties and with two "improved" high-yielding varieties. While the local varieties showed an average increase of 17 per cent (+ 450 kg/ha), the "improved" ones yielded 19% (+ 750 kg/ha) more compared to the traditional rice production systems. Although positive, these results also showed that SRI is not a package or a recipe to follow in all areas and all farming households.

The uptake of SRI was much lower in the Delta than in Rakhine. In the Delta, the average area managed by each farmer family is larger, and farmers are used to seed broadcasting methods. The availability of labour and the transplanting skills, as well as the access to finance for hiring labour, were amongst the main hurdles identified. Other farmers mentioned the lack of time (the planting period is short and this does not let farmers cover a large area) and a lack of equipment. Much better adoption rates were seen with seed producers, who are already used to providing extra care to their plots; they could cover the additional labour costs by getting a better price for the higher quality seed. In 2010, seed producers increased their incomes by 40 per cent.

Our work in these two different areas showed how, before any introduction or demonstration, it is important to carefully consider the agro-ecological and socio-economic conditions in the target area. These will influence the uptake and impact of SRI. This also showed the need to adjust our practices, switching from transplanting to direct sowing and testing two different mechanical seeders. Building upon the findings of these first years, the project in the Delta has supported the introduction of "customised versions" which still lead to lower production costs and higher yields, and contribute enormously to improved food security and livelihoods.

Pierre Ferrand (ferrand@gret.org) is an agronomist currently working at GRET as a Project Officer. He worked in Northern Rakhine State as Technical Co-ordinator from 2006 to 2008 and in the Ayeyarwaddy Delta as Project Manager from 2009 to 2011. **Hla Min** (hlamin@gmail.com) is a recently retired agronomist. He worked as Senior Agronomist in Northern Rakhine State from 2004 to 2008 and in the Ayeyarwaddy Delta as Technical Co-ordinator from 2009 to 2012.

A visual guide to SRI

The World Bank Institute (WBI) developed the multimedia toolkit "Achieving more with less: A new way of rice cultivation" to illustrate knowledge and techniques on SRI. The toolkit was developed from an experience with SRI in the Philippines in 2007, where farmers piloted the approach within their specific socio-environmental conditions, with very encouraging results in terms of yields and water savings.

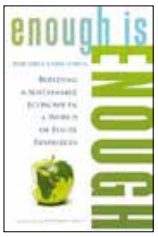
Text: Laura Eggens Illustration: Fred Geven

The toolkit is aimed at different target groups, including farmers, extension staff, researchers and policy makers. "We wanted to have something both informative and practical," explains Dr Mei Xie, Programme Leader of the Climate-Smart Agriculture Unit of WBI. "Something visual, so that people who are not familiar with rice can get the message, and that extension staff can understand and show to their farmers." The toolkit comes in three parts. One targets the general public: it is simple, short and emphasises the advantages and constraints of SRI's innovative practices. A second is a straightforward "how-to" guide for practitioners which "is easy for farmers to understand." The third section contains different views on SRI adoption, dissemination, and research, presenting video and audio interviews with farmers, practitioners, researchers and other stakeholders. These include people who have tried it successfully and people who still have reservations.

The goal is to disseminate SRI knowledge to a wider audience. Mei Xie proudly explains that the toolkit is successful in this endeavour: "So far, the SRI toolkit has become the most viewed of our learning products. People from all over the world contact us about it." She tells the story of two Kenyan farmers who learnt about SRI through a series of mutual learning events organised by WBI between farmers and stakeholders in Kenya, India, Madagascar, Rwanda, Indonesia and the Philippines. In 2009, they were brave enough to be the first farmers in Kenya to experiment with SRI, doing so without any funding or technical support. "Now, three years later, around 3,000 farmers in their area are practicing SRI. Local research institutions and universities are now working with government agencies to facilitate farmer-to-farmer learning. If farmers' willingness is complemented with local knowledge, the adoption can be scaled up."

The toolkit has also become a teaching material for professors at local universities in both East and West Africa, and has been translated by an agricultural research centre in Malawi. From 2009 to 2012, WBI has used the toolkit in South-South learning events which include SRI and conservation farming as climate change adaptation measures. Farmers, government staff and researchers in Kenya and Malawi have reviewed the toolkit and discussed it with colleagues in other countries (such as India, Madagascar and Rwanda) via video-conferencing. "As a result of the South-South exchange, Indian practitioners used the SRI toolkit as a basis for training government officials, university researchers, local artisans and farmers at farmer schools in Kenya," Mei Xie recalls. At one of these occasions a Malawian farmer commented: "You have given us something better than money, because you can only use money once. This is so good, and it will be with us the rest of our lives and we will be able to make much more out of it."

The World Bank Institute is the capacity development branch of the World Bank. It designs and delivers learning programmes for development stakeholders, and collaborates with policy makers, civil servants, technical experts, business and community leaders, parliamentarians, civil society stakeholders and other learning institutions. For more information on the SRI toolkit or the South-South learning events, contact Mei Xie (mxie@worldbank.org).



Enough is enough: Building a sustainable economy in a world of finite resources

R. Dietz and D. O'Neill, 2013. Routledge, Oxon. 240 pages.

This book condemns the idea of economic growth as a model for development, arguing that the continuous pursuit of economic growth has created problems such as climate change, social inequality and environmental degradation. Instead, the authors develop the idea of the "steady state economy" as an ecologically and socially responsible alternative. The first part of the book summarises the scientific critiques of the model of economic growth. The second part proposes different policies to make the steady state economy a reality. These include policies on limiting the use of resources, stabilising population and redistributing income and wealth. The final part is a plan of action aimed at changing consumer behaviour, politics and international co-operation.

Nourishing the world sustainably: Scaling up agroecology

Ecumenical Advocacy Alliance, 2012. EAA, Geneva. 98 pages.

There is rich empirical evidence and growing theoretical insights into the success of agro-ecology. Now, this book argues, is the time to advance agro-ecology further. This highly accessible document describes what agro-ecology is, how it differs from other sustainable farming methods, how it can strengthen resilience to climate change and how it can increase food security. The Ecumenical Advocacy Alliance also identifies the challenges for scaling up agro-ecological innovations. These range from a lack of practical knowledge on the part of researchers and extension agents to biased agricultural policies and market failures. The final part of this document shows how government policies, NGOs, farmer-to-farmer networks and local markets can be used to scale up this approach.

The roads from Rio: Lessons learned from twenty years of multilateral environmental negotiations

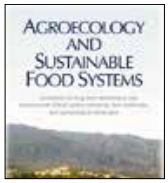
P.S. Chasek and L.M. Wagner (eds.), 2012. Routledge, New York. 308 pages.

The United Nations Conference on Environmental and Development (UNCED), better known as the Earth Summit, held in Rio de Janeiro in 1992, marked a new era in the world of international environmental treaties. Several new institutions, including the United Nations Commission on Sustainable Development and the United Nations Environmental Programme, were founded, and numerous treaties signed in its aftermath. Rather than focussing on the impact or effectiveness of these treaties and institutions, the authors of this book focus on the negotiations, looking at their evolution and at the main actors involved.

Renewing innovation systems in agriculture and food: How to go towards more sustainability?

E. Coudel, H. Devautour, C.T. Soulard, G. Faure and B. Hubert (eds.), 2013. Wageningen Academic Publishers, 240 pages.

Many researchers continue to see innovation as a matter of disseminating technologies, developed in field stations or laboratories, amongst farmers. This book adopts a system-based perspective, viewing innovation as a process that involves different actors and organisations, operating at different levels and with different rules, norms and power. Tensions between actors or around the construction of shared goals are the dynamics that drive the innovation process and determine its success or failure. The first part of this book looks at the current challenges facing innovation systems. The second part addresses on-the-ground questions about how these new insights are used (or not), looking at, for example, cropping and farming systems, social inclusion and market innovation. The third part explores the main policy implications of the authors' findings.



Agroecology and the transformation of agri-food systems: Transdisciplinary and participatory perspectives

V.E. Méndez, C. Bacon and R. Cohen (eds.), 2013. Agroecology and Sustainable Food Systems, 37:1, 146 pages.

This is the first issue of *Agroecology and Sustainable Food Systems*, formerly known as the *Journal of Sustainable Food Systems*. Like its predecessor, the journal will continue to focus on the food system transformations that are needed to balance natural resource use and environmental protection with the needs of production, economic viability and social justice. This issue brings together perspectives that integrate transdisciplinary, participatory and action oriented approaches. The articles cover topics ranging from the emergence of agro-ecology, to new modes of learning and a set of case studies that trace the evolution of agro-ecology in Spain, the United States and Brazil.

Advancing agroforestry on the policy agenda: A guide for decision makers

G. Buttoud 2013, FAO, Rome. 38 pages.

The benefits of agroforestry have been proven to be numerous in practice and science. Agroforestry systems are productive, sustainable and resilient. They also sustain livelihoods, combat global warming and maintain and enhance the productive capacity of natural resources. Nevertheless the advancement of agroforestry is often hampered by unfavourable legal, policy and institutional environments. The first part of this publication looks at the factors that stimulate and inhibit the advancement of agroforestry. The second part derives lessons from success stories in Niger, Malawi, France, Costa Rica, the United States, Guatemala and Canada. Amongst these lessons are: spread the word, secure the land, organise and synergise, and include all stakeholders.

More on SRI

Practical information on SRI can be obtained from different sources, like "How to help rice plants grow better and produce more: Teach yourself and others" (Association Tefy Saina and CIIFAD). "The scientific case for system of rice intensification and its relevance for sustainable crop intensification" (Willem Stoop, 2011) reviews the academic literature on SRI and provides a scientific basis for it. "System of Rice Intensification: A synthesis of scientific experiments and experiences" (B.J. Pandian *et. al.*, 2011) is a highly informative book on SRI in India but also relevant for other countries. "Transforming rice production with SRI: Reducing agriculture foot print and ensuring food security" (T.M. Thiyagarajan and B. Gujja, 2012) describes how SRI has spread throughout India. The IFAD publication "Spreading the system of rice intensification across east and southern Africa" (F. Rappocciolo, 2012) discusses some of the challenges for the advancement of SRI in Africa. *SRI-Rice ONLINE* is a comprehensive website maintained by the SRI International Network and Resource Center at Cornell University. The website includes links to organisations, scientific publications, proceedings, practical information, newspaper articles, blog posts, video and photos on SRI from different sources and countries. (LvdB)

More than a recipe to follow, SRI is a set of principles adapted to specific environmental or socio-economic conditions. As "work in progress", these ideas are the result of trials and experiments carried out at different levels.

Nepal

Farmer Field Schools

The northern Nepalese region of Lalbojhi-Bhajani is very fertile, but water is not always available, limiting farmers' options. Working to enhance food security, the European Union Food Facility Project decided to look at the potential advantages of SRI, setting up a demonstration plot of 1,500 m^2 in May 2010. This produced twice as much rice as a conventional field, using no fertilizers and with less water. This encouraged the project to start six Farmer Field Schools in different villages in the district. Twenty-five farmers gathered in each one every week, throughout the season, studying the effects of different weeding practices, the age of the seedlings and the spacing needed. The overall yields, again, were at least twice as high as normal. Thirty new Farmer Field Schools were started in 2011, focusing on those aspects which required extra attention, such as weeding or the use of short-duration rice varieties, better suited for early season planting. The adoption of SRI has been positive, covering a total of 80 hectares in the early rice season of 2011, and more than 120 hectares in 2012.

For more information, contact Ram Bahadur Khadka, former Programme Co-ordinator of the European Union Food Facility Project. E-mail: vijayautsarga@gmail.com

Photo: Ram Khadka

Ethiopia

Trying out the System of Tef Intensification

Tef, the main staple food of the Ethiopian diet, is grown on at least 2.8 million hectares in Ethiopia. Yet the national average yield is 1.2 tons/hectare: technologies that improve yields can benefit farmers and the country at large. Researchers at the DebreZeit Agricultural Research Centre tried to see if yields could improve by changing the planting methods, following the principles of SRI. Farmers traditionally broadcast the very small seeds at a rate of 25-50 kg/ha. In the experiment, tef seedlings were grown for two weeks and then transplanted, with a spacing of 20 cm x 20 cm. The researchers also tried two different varieties, and two different fertilizer treatments, and compared these approaches to the standard broadcasting method. Yields increased fourfold. The main effect of transplanting was an increase in the number of tillers, but benefits were also seen in the production of stronger tiller culms and an increase in the number of seeds and panicles. Similar experiments are now being tried with farmers.

Photo: DebreZeit Research Centre

For more information, contact Tareke Berhe, Tef and Rice Value Chains Director at the Agricultural Transformation Agency. E-mail: tareke.berhe@ata.gov.et

Dominican Republic

Lower costs, higher incomes

Although rice is the main crop in the Dominican Republic in terms of area, and local production is sufficient to satisfy national demand, production costs are high. Local production is threatened as cheaper foreign rice will get into the country when tariffs disappear as a result of the Free Trade Agreement signed with the United States. The National Council for Agricultural and Forestry Research has started a project that aims to scale up the results seen in a set of trials carried out by the Inter-American Institute for Cooperation on Agriculture with small-scale farmers, in different parts of the country. One of these took place in the province of Monte Plata, where Fabio Dasa, a farmer, harvested a total of 11.6 tons/hectare. Researchers and extensionists are not only interested in obtaining higher yields, but also in the other benefits seen in Monte Plata. These include rice with more panicles and heavier grains, which mean that farmers get a better price. SRI also reduces farmers' production costs as, for example, less seed is used.

Photo: Manuel Sánchez Hermosillo

For more information, contact Manuel Sánchez Hermosillo, IICA representative in the Dominican Republic. E-mail: manuel.sanchez@iica.int

Pakistan

Mechanising SRI production

Even a country with a large population can face agricultural labour shortages. This is one of the main difficulties mentioned by SRI practitioners, yet it is a problem that can be overcome. FarmMore is a company that specialises in agricultural mechanisation processes; since 2009 it has taken on the challenge of designing, developing and manufacturing machines that can help reduce the labour burden faced by small-scale SRI farmers. Working with research stations and with farmers, FarmMore has been focusing on developing an easier way to level the paddy field (and thereby helping to reduce the amount of water needed), and machinery that distributes compost efficiently, places the seedlings in the soil and weeds the fields. As elsewhere, SRI trials in the Punjab have shown a reduction in water required of up to 70 per cent, and also shown higher yields. These studies have also shown an additional benefit: only 25 man-hours were needed, instead of 85. These obvious benefits are encouraging farmers to try using these machines with other crops, such as carrots and wheat.

Photo: FarmMore

For more information, contact Asif Sharif, at FarmMore, Lahore. E-mail: aasifsharif@gmail.com

SCI: Planting with

With wider spaces between rows and plants, SCI is now becoming the "normal" way of growing finger millet.
Photo: Hailu Araya / ISD

space

The use of finger millet seedlings has shown very positive results in the region of Tahtai Maichew, near Aksum, Ethiopia, as has the use has the use of alternative management practices for a number of other crops. The principles that make up a System of Crop Intensification are now spreading through the regions of Tigray and South Wollo for a range of crops.

Hailu Araya, Sue Edwards, Arefayne Asmelash, Hailu Legesse, Gebre Hiwet Zibelo, Tsehaye Assefa, Endris Mohammed and Sara Misgina

Agriculture, mainly rainfed and subsistence-based, is Ethiopia's main economic activity, contributing 50 percent of the country's GDP, and up to 80 percent of the employment opportunities. However, small-scale farmers are increasingly confronted with a changing climate and need to adapt their practices. Unreliable rainfall has pressed farmers to shift their cropping patterns – especially in the most water-stressed regions. When the rainy season comes late, and as the moisture constraints become more serious, farmers shift from long growing-season crops like sorghum and/or finger millet, to wheat or barley, and to tef and chick pea. This solution creates its own problems, as shifting from one crop to another is costly in kind and cash, and farmers become more likely to fall into debt and or sell their assets.

A new technique in the making

Back in 2002, Ato Aregawi Abay, then head of the Agricultural Bureau of the Tigray region, started working with the Institute for Sustainable Development (ISD) to find ways to tackle crop failure due to unreliable water supply. Knowing that Ethiopia is a drought-ridden country, we started to look for those farmer practices in our project areas in Tigray that could help minimise the risk of crop failure. When we reached the community of Sherafo we heard that its entire crop production was lost during the Great Drought of 1984/85 – except for the crop of Priest Haregot. He had taken the unusual action of uprooting his younger finger millet plants and replanting them in the moist river bed. By doing so, he obtained sufficient crop to have seed for the next rainy season.

Building on this experience, as well as on information from the Niger river basin in West Africa (where farmers raise seedlings of sorghum and pearl millet in seed beds and then plant them in their fields as the flood waters from the Niger river retreat), we decided to look for ways that would help farmers extend the growing season for their slow-growing crops and counter the shortage of rain or moisture in their fields. We started to look at the SRI practices developed in Madagascar in the 1980s, and at the possibilities of developing a similar system for wheat or tef.

Now known as SCI, the System of Crop Intensification is based on a series of management practices, basically consisting of directly sowing seeds or transplanting seedlings in compost-treated soil, with wider spacing than normal between the rows and plants (and therefore referred to by farmers as "planting with space"). Weed control is done with simple tools that disturb the soil and help aerate it. ISD has been working with farmers and local technicians to find out how SCI can be applied in the Tigray region; which crops give the best responses;

and how farmers can integrate SCI into their farming practices.

A case in Tigray Farmers in Ethiopia have traditionally relied on broadcasting as a technique for sowing all their field crops: randomly throwing seeds within marked-out sections of their field. This type of sowing is faster but not always efficient, and it can be labour-intensive, as it makes weeding and harvesting more difficult. It results in an inefficient use of moisture, with competition between plants for water (as well as nutrients). As a result of this, the resources and time used are poorly repaid, and productivity levels remain low.

We met a group of local agricultural experts in the Tahtai Maichew *woreda* (district) in 2003 to address these issues. Seedlings of finger millet were raised for 30 days in a state-owned nursery and then distributed to three farmers in the Mai Berazio village area. Only one of the three had positive results, an elderly woman called Mama Yehanusu Atsbeha. She planted the seedlings in a 5 x 5 m area in a field where she had applied compost to the soil, leaving 25 to 30 cm space between the plants. She also sowed the same variety of finger millet seeds directly into the rest of her field.

The results were impressive. At an early stage, the plot of transplanted seedlings looked sparse; but later on the crop became dense with many tillers, each having longer, denser fingers (panicles) than the seed-sown plants in the rest of the field. She got a yield equivalent to 7.6 tons/ha, while the yield of the rest of the field, which had been sown by broadcasting at the same time as the seedlings were planted, gave her a yield equivalent to 2.8 tons/ha. Further field observations with other farmers and other crops confirmed the increased vigour of transplanted, well-spaced, row-planted crops, which had more tillers per plant. The cereals had larger seed heads and the pulses more pods along the stem.

Local technicians and many neighbour farmers were present when Mama Yehanusu harvested her crop. Not surprisingly, many farmers began adopting "her" way of raising finger millet seedlings before the start of the main rainy season. They have shown that Mama Yehanusu's field was not a one-time success. In their fields and in different training centres, farmers and development agents have been able to raise the yield of finger millet to 5-7 tons/ha by raising seedlings and transplanting them. With conventional broadcasting methods, average yields remain about 1.3 tons per hectare.

Spreading the word After meeting Norman Uphoff in 2008, and following the successful experience in Tahtai Maichew reported above, ISD organised a series of training workshops in research stations, farmers' training centres and on farmers' fields, focused on the preparation of healthy seedlings and on the best way to transplant them, combined with the making and use of compost, with or without chemical fertilizer.

Farmers showed a strong interest in these approaches and many quickly started to try them out, preparing seedlings and transplanting them into small plots. Farm-

Lessons learned

In addition to increasing production, transplanting seedlings of finger millet and other crops has shown various advantages:

- Using this technique, crops become more tolerant to drought and water-logged soil;
- Transplanting seedlings reduces the amount of seed required by at least 75% compared to broadcast sowing;
- Onerous labour is reduced because:
  - transplanting facilitates inter-row and inter-plant weed control, enabling farmers to use simple weeding tools to incorporate the weeds into the soil to boost fertility, or collect them for animal feed, which is much needed while the movement of animals for grazing is restricted during the growing season;
  - aerating the soil stimulates the growth of plant roots and benefits aerobic soil organisms;
  - harvesting by sickle becomes easier as plant growth is more uniform and the mature panicles do not get tangled up as they do in a broadcast sown field;
- Establishing the crop in rows allows for a more efficient use of inputs (compost, fertilizers, etc.), which are placed alongside the seed or in the hole with the seedling rather than being spread over the whole field;
- These changes in practice can also help farmers mitigate or adapt to changes in climate because seedlings can be raised in small areas, making more efficient use of the available water. They are then transplanted when the soil is moist. Their roots grow bigger and deeper, making better use of the moisture at lower soil depths;
- Farmers in some moisture-stressed areas using SCI have also started to make water-retention structures between the rows in the fields to help maintain the soil moisture.

ers experimented with tef, other cereals and even pulses. Tef is Ethiopia's iconic and most popular cereal, cereal, but is grown with traditional methods, with an average grain yield across the country of 1 ton/ha. Tef has responded dramatically to "planting with space" with yields of 2.5-5.0 tons/ha being achieved in farmers' fields, and even over 6 tons/ha under research conditions. Improving tef production based on SCI principles is now a major programme of the Ethiopian government's Agricultural Transformation Agency (ATA). In 2012, more than 50,000 farmers and 1,200 Farmers' Training Centers were expected to use SCI for growing tef.

SCI is now becoming the "normal" way of growing finger millet. In 2011 there were 118 farmers using this technology in Tahtai Maichew alone. These practices have spread through farmer-to-farmer contact from a few in the Tahtai Maichew and La'elai Maichew *woredas* to other districts in Tigray and South Wollo. Trying them first on small plots, farmers are are now applying SCI as standard practice for their most commercially valuable crops. The results from SCI have also convinced development agents, technicians and policy makers.

Remaining challenges

While the use of seedlings and "planting with space" are spreading rapidly, one of the main challenges is the need for continuous training and follow-up, which is beyond the capacity of ISD. This is linked to another difficulty: many farmers still do not feel comfortable with the wider spaces left between plants (there is a common perception that this is "wasted land"). It allows many weeds to emerge during the early stages of the crops' growth and involves an initial additional labour input compared to broadcasting. In a way, SCI requires a leap of trust, which needs underpinning by observation and experience, not just by words. Hence, getting farmers to experiment with the new ideas for themselves is important.

SCI can help farmers to produce their crops more efficiently and address the problems of small fields, food insecurity, low incomes and climate change. To be successful, SCI needs to lead to a more predictable and increased agricultural production and reduced production costs. Farmers are showing that SCI has the potential to greatly increase a household's food security and reduce their costs. Its broader dissemination, however, requires support from local administrations, experts and civil society organisations, drawing on their different experiences and expertise, and making effective use of their resources.

SCI requires a leap of trust – but the results are soon evident. Photos: ISD

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2014 will be the UN International Year of Family Farming. Stay posted for regular updates in upcoming issues of *Farming Matters*, on www.agriculturesnetwork.org and on www.familyfarmingcampaign.net

New initiatives

The System of Rice Intensification was originally developed in Madagascar from the 1960s onwards, with the practices being integrated in the 1980s. Its acceptance has been slow in its country of origin, however today, as in many other countries throughout the world, new initiatives are emerging. More people are promoting SRI, and more farmers are harvesting the results.

Alain Oscar

Positive steps towards food security. Photos: Alain Oscar

Founded in 1989, CODEGAZ is a French non-profit organisation promoting food security in many different countries. Since 2009, it has been developing four organic SRI-based projects, two of them in Madagascar. The first was implemented in the Ménabé region, where 150 families were invited to follow a training programme aimed at increasing their food security and helping them overcome poverty. Since 2010, CODEGAZ has been developing a larger-scale SRI project to train 3,000 families in Morarano.

Work in Morarano began with a meeting with members of the Malagasy association TAOEZAKA, founded by a follower of SRI's originator, Henri de Laulanié. It identified the villagers' greatest need as increasing and diversifying their food crops and, in particular, improving their rice production. A needs assessment exercise showed large numbers of greatly deprived people within the region. Most rural inhabitants live from agriculture and face chronic food insecurity, particularly in the period between their two rice crops. The main reasons for this are the very small size of their plots (often just 0.25 hectares), the poor quality of their soils and insufficient yields (just 2 ton/ha).

Many people face a life of malnutrition and debt, which drives many to migrate to city slums.

SRI and market crops as an answer Drawing on previous experience of carrying out SRI projects in similar situations, CODEGAZ developed a pilot project in 2010 with TAOEZAKA. They began to train farmers in SRI methods and organic production of crops for the market, which made better use of the resources available to them. In the first year, the pilot project trained 1,117 farmers, focusing on how to increase their food security. This began to yield results, helping to reduce poverty levels among those who practised these techniques.

After this initial success, CODEGAZ and TAOEZAKA decided to extend the project to nine villages within the Morarano commune, with the aim of training 3,000 farmers over three years. The project had three main objectives: (1) significantly improve food security; (2) reduce poverty levels; and (3) preserve the environment and natural resources.

The strategy for achieving the first objective was to increase rice production and diversify food production, growing other crops between the rice seasons. Expanding the production of rice and vegetables beyond household consumption needs will enable families to sell the surpluses. Environmental protection was achieved through reducing the use of water, and employing the use of compost and organic soil management techniques. Growing other crops also plays an important role here, because it allows the soil to be naturally fertilized between rice seasons by bringing in leguminous crops.

Good results The 2011-2012 campaign showed encouraging results: 1,549 farmers were

SRI in Madagascar

SRI has only been slowly accepted in Madagascar, partly due to initial resistance from government actors and the few rice scientists in the country. An important consideration was the relative labour-intensity of SRI. Most Malagasy rice farmers were used to production methods that require far less labour input in the early stages. The discipline and demands of SRI practice made it unattractive even if farmers saw the potential of increased yield. SRI practices can become *labour saving* once they have been mastered, but the transition to SRI crop management often requires more labour than many Malagasy farmers were willing to expend, and more than poor households might be able to afford.

It is difficult to assess the extent to which traditional beliefs were a deterrent for adopting SRI. In indigenous Malagasy culture people are taught that they should respect and follow "the ways of the ancestors" – or risk the wrath and retaliation of their ancestors' spirits for showing disrespect. In Madagascar, rice is not just a food crop; it also has cultural significance. And practising SRI is a very public matter. Everyone can see when SRI methods are being used because the fields are initially almost bare, with sparsely-placed tiny seedlings, and then they are profuse at harvest time (making the SRI farmer possibly a target for jealousy among neighbours). It takes considerable independence of thought and bravery on the part of pioneer SRI farmers to deviate from long-established practices.

Paradoxically, the uptake of SRI methods has been much greater in other countries, although this is now changing. Malagasies are learning that farmers in other countries are making good use of the techniques discovered in their own homeland, while their own rice sector continues to be relatively stagnant. Association Tefy Saina, the NGO that Father de Laulanié established with Malagasy friends and colleagues in 1990, has, together with many other organisations, persevered with its extension efforts. Today the Malagasy government is taking a more favourable, proactive stance toward SRI, while major conservation groups and various donor agencies are also backing its spread.

A turning point in the acceptance of SRI in Madagascar occurred in 2008, when Jim Carrey's Better U Foundation decided to support the establishment of a national SRI network and secretariat for Madagascar, known as *Groupement SRI* (or GSRI). At the outset it had 13 member-partners; now it has 13 regional platforms and 267 members, ranging from well-recognised international NGOs to small community organisations, as well as some international partners. The Secretariat is based in Antananarivo and operates a website in Malagasy, French and English (http://groupementsrimada.org/). Data provided by GSRI member-partners indicate that in 2012, there were more than 218,000 farmers using SRI methods on 63,714 hectares, getting yields of five to six tons/ha, two to three times the typical paddy yield in Madagascar. The Secretariat estimates the total SRI area is 130,000 hectares. (Norman Uphoff)

trained in SRI methods, and 434 rice farmers applied SRI methods on 85 hectares of paddy fields. Yields in these paddy fields tripled, giving an average of 8 to 9 tons per hectare.

A small study of a sample of 20 participating households provided evidence that adapting SRI methods has been extremely beneficial. There was an improvement in the families' financial situation, their health, their children's education and their general well-being. The rice growers interviewed were unanimous about the effectiveness of SRI, especially those with very small plots, who previously struggled to grow enough to meet household needs.

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SRI in Mali

Hamidou Guindo had been in charge of the Mali Ministry of Agriculture's SRI programme in the eastern region of Gao for three years, but had to flee after the jihadists took over in March 2012. He returned to his hometown of Douentza, then still under government control, and together with a few colleagues set up *3A-Sahel*, a self-help association.

Farmers around Douentza have little access to store-bought seed or fertiliser, but can use SRI as it does not require outside inputs. This presented Hamidou with an opportunity to examine how farmers at a new site adapted the methodology to their conditions. With a small grant from the NGO SRI Global and collaborating with SRI-Rice from Cornell University, 3A-Sahel worked to introduce SRI in seven villages with ten farmers per village using comparison trials and collecting systematic data.

Hamidou and his team worked closely with farmers and the village authorities, and supplied basic tools and the simple, locally-made mechanical weeders needed for SRI. The project was going well, but everything became complicated in early September, when well-armed jihadists occupied the town. Suddenly there were roadblocks everywhere; the school was shut down; men were forbidden to shave. Anyone found with a laptop or camera was interrogated and risked a beating.

To get around without arousing suspicion, Hamidou and his team let their beards grow and dressed in the simple, worn clothing of village farmers. Fortunately, the team was able to finish their work unharmed. They harvested the 140 control and SRI plots following scientific methods. These showed excellent results: yields on the SRI plots averaged 8 tons/ha, which was almost double of 4.3 tons/ha obtained in the control plots.

In January 2013 the jihadist occupiers fled Douentza following the French intervention. Farmers can move around freely again. As information about SRI results circulates, more people knock at Hamidou's door to ask to learn about the new method. 3-A Sahel has developed a proposal for the 2013/2014 season with the aim of making knowledge about SRI available to all interested farmers around Douentza. (Edward Baxter, Director of SRI Global Inc. E-mail: sri.global.inc@gmail.com)

Hamidou Guindo holding up two plants: SRI plant on right, "conventional" plant on left. Photo: Erika Styger

Agro-ecology in action

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Some thirty years ago, near the town of Nagua in the Dominican Republic, small-scale rice farmers were experimenting with transplanting seedlings. The uncertainty of timely water availability and/or tools for soil preparation – small tractors or oxen ploughs – meant that some of the seedlings remained in their seedbeds way beyond the official planting deadlines of 30 to 40 days. This had immediate implications for the farmers – that they would not be eligible for credit that year. This forced the unlucky farmers to experiment with a larger planting distance which would allow them to employ manual weeding techniques (rather than rely on what were now unaffordable chemicals) and to use manure instead of expensive chemical fertilizers. They planted a mixture of older seedlings and younger ones from a second seedbed and varied the number of seedlings per hole. I saw them obtain yields that were up to 90% of those of their colleagues with credit facilities.

The lecturers at the university where I was studying bluntly silenced my enthusiasm about these observations, stating that the way to produce rice was already "well-established and crystal clear", and that any other approach was non-productive. What I learnt was that this rigid production model does not fit the many uncertainties – or opportunities – that rice farmers face. And that it has neither allowed for any real breakthrough as far as production levels are concerned!

Since 1999, the System of Rice Intensification (SRI) has been spreading from Madagascar to many other countries. Thanks to the efforts of many people, and to the information shared in, among others, the old *LEISA Magazine* (with articles I had the good fortune to select and edit), many people have been motivated to experiment with the approach and evaluate it for themselves. And this process is ongoing. Some of the farmer groups I worked with in Indonesia, for example, were sceptical when they first heard about SRI. Then some – often younger – farmers would try it and allow the whole group see the results. What appealed to me most was that, in their enthusiasm, some farmers would carry on experimenting. On the island of Timor, for instance, some farmers used to leave a few roselle plants (*Hibiscus sabdariffa*) growing in rice fields when they did their weeding as these provided a spice used to flavour local meat dishes. When farmers learned about the high economic value of the dried red calyces of the roselle flowers, they immediately started trying out larger quantities of roselle in their traditionally mono-cropped rice fields.

Now, like thirty years ago, this is agro-ecology in action. And everywhere farmers are taking the lead.

SRI in Bihar: From one to 350,000

Farmers in Bihar were initially sceptical when they heard about the System of Rice Intensification, five years ago. Only one farmer decided to try it. From then, first by word of mouth and now with government support, SRI has gone from strength to strength. In 2012, Bihar had some 335,000 hectares of SRI paddy and had a record rice harvest. One small-scale farmer has broken the world record for rice production, achieving a staggering 22.4 tons/hectare, almost 10 times the previous typical yield in the state.

Anil Kumar Verma

I came to Gaya, a district in the Indian state of Bihar, in 2007, with the specific objective of encouraging women farmers to try SRI in their fields. I was expecting some difficulties, yet I was stunned by their lack of interest. Their opinion was clearly expressed by one of the farmers who came to listen to the SRI documentary I had brought to Shekhwara, a village in the Bodh Gaya block: "This man has come to fool us. We have been growing paddy for generations. We know how to do it!" Only when I was leaving this meeting did one of the participants, Mrs Kunti Devi, come to me and, showing sympathy, said she'd try it out. She faced enormous pressure from her neighbours, yet said she was willing to try. Their opinion changed when the tillers started coming out after just 12 to 15 days – and when she harvested the equivalent was nine tons per hectare.

A large number of women from Shekhwara and other villages heard about this and came to talk to Kunti Devi, and to count the number of tillers. More than 100 women in Gaya decided to try SRI in a part of their fields, together with 25 women in the neighbouring district of Nalanda. These plots were visited by researchers from the *Krishi Vigyan Kendra* (Farm Science Centre), a government institution that is connected with the Bihar Agriculture University, and also from the Agriculture Technology Management Agency, ATMA. Both scientists and officers were invited to the fields to cut the crops and estimate the total yields. The Agriculture Director of the Magadh Division was one of those present when the results were announced: 12.5 tons/hectare. The high yields they witnessed convinced them to bring their colleagues and superiors to the field – and convinced more farmers to join us.

PRADAN organised a series of workshops in both districts, and before long, there were SRI songs and SRI plays, and even an SRI *adhivesan*, or a get-together of SRI farmers in the district. More and more farmers were talking about SRI and harvesting better yields with reduced inputs.

From "rice intensification" to "root intensification"

There was so much interest that we set ourselves a high target for the coming year, hoping to work with 2,000 farmers. This

Ms Jyoti Devi (left) discussing the performance of eggplant SCI in her fields. Photo: Erika Styger

was far exceeded as a total of 5,146 tried SRI in their fields. The Chief Executive Officer of the Bihar Rural Livelihood Promotion Society (BRLPS), a World Bank-funded project run by the state government in Patna, and the District Agriculture Officer in Nalanda took particular interest in what was happening, and came to the fields several times. The local district magistrates and commissioners went to the villages several times to encourage and congratulate all the farmers for "their enormous contribution in ensuring the food security of these communities".

For the 2008-2009 season, ATMA provided a small grant to PRADAN and with the support of the BRLPS we started trying to apply the principles of SRI to wheat in Gaya and Nalanda, working with 278 farmers. Having seen such clear results with paddy, there was little resistance to the idea of trying a similar approach with wheat. The low seed requirement and the higher yields motivated many farmers to try it out, even if they also feared the additional labour needs (especially at the time of sowing). Once again, a large number of people visited these plots, including farmers, local government officials and even representatives of the Indian Council of Agriculture Research. At the end of the 2009-2010 season, we counted more than 15,000 SRI wheat farms.

At the same time, PRADAN was also implementing the Diversion-Based Irrigation Project, supported by the Tata Trust. As part of this project, we started piloting SRI applications to *brinjal* (aubergine), tomato, bitter gourd and chillies in Gaya district. During the 2009-10 season, ATMA invited PRADAN to run a pilot project to validate SRI methods for enhancing the yields of rapeseed (mustard); and since 2011 we have also been working with sugar cane. Working with other crops has made us look in more detail at the main principles behind SRI and at the logic of providing more space for roots to grow. SRI came to be known as the System of Root Intensification, applying to many crops beyond rice, and it has been taken up in this form by the Agriculture Technology Management Agency and other government agencies. It is a happy coincidence that "sri" is a word used to express respect in Sanskrit and Hindi; "Sri Vidhi" or "SRI method", quickly became a common name among the rural communities and the policy makers in Bihar.

Amplifying on the initial strategy, a large number of scientists and authorities have been invited to visit these different SRI plots, and this has led to interesting exchanges of information with, for example, representatives of the Wheat Research Institute and with scientists at the Rapeseed Mustard Research Institute in Bharatpur, Rajasthan. The Joint Secretary of the Ministry of Rural Development in New Delhi, T. Vijay Kumar, came along with various state officials to visit the SRI wheat fields and meet the women belonging to the self-help groups promoted by the BRLPS.

In 2010 we were visited by Jayram Ramesh, the Indian Minister for Rural Development. Scientists from the National Institute of Rural Development in Hyderabad, and even from the International Rice Research Institute in the Philippines came to see the SRI vegetables along with local government officials. The higher yields have helped convince farmers to continue experimenting with SRI ideas and methods, but they have also been fundamental in convincing donors and authorities, from the district Rural Development Authorities to those in New Delhi.

More SRI In early 2009, the Chief Minister of the Government of Bihar invited farmers from the

whole state to come to a *Kisan Mahapanchayat* or "big farmers collective". More than 2,500 farmers participated in this meeting together with Mr Nitish Kumar, the Chief Minister, and members of the Council of Ministers and many other top state officials. One of the invited farmers was Mrs Barati Devi from Gaya, who had obtained a yield of 18.1 tons/ha in her fields. She was asked by the organisers of the meeting to share her experiences in two minutes. The Chief Minister was very surprised to hear a village woman sharing such impressive results clearly and confidently, so he asked the organisers to give her more time. She ended up speaking for half an hour, describing her experiences – and convincing all those present.

BRLPS organised another big meeting with the members of the women self-help groups in October 2009. An SRI stall attracted the attention of the Chief Minister. He visited the stall before the inauguration of the meeting, and spent most of his time at the fair at the SRI stall, where he took great interest in the manual on *SRI Vidhi*. Addressing the meeting later, he referred to the System of Root Intensification as *khadyan samasya ka hal hi nikal ayega*: a solution to the food security issue in Bihar.

A few months later, the same Chief Minister came to Gaya with the State Agriculture Minister, Mrs Renu Kumari Kusawaha. Their visits to SWI wheat fields in Shekhwara, and their interactions with all farmers, convinced even more authorities, among them the Agriculture Production Commissioner, and this was a key factor in the state government's decision to encourage the broader dissemination of SRI throughout the state. The government invited PRADAN to run a training programme in the different divisions. We started working with village women as facilitators, training both farmers and the government officials. It was very encouraging to see that, in spite of the severe drought experienced between 2009 and 2010, interest in our work did not diminish.

Even more encouragingly, the state government declared 2011 as the SRI year, calling it *SRI Kranti* or the "SRI Revolution". Different government agencies developed printed extension materials with the help of the Agriculture Training and Management Agency, which supplemented the ones that PRADAN had already prepared. During the first days of January 2011, the Chief Minister himself opened the SRI Kranti year with a special session at the S. K. Memorial Hall in Patna. In front of more than 2,600 district officers, he expressed his government's intention of reaching 350,000 hectares of SRI rice in the coming years. The Director of the Bihar Agriculture Management Extension and Training Institute, Dr R.K. Sohane, played a crucial role in organising a series of training workshops across all the divisions and districts of Bihar. The media, both print and electronic, helped disseminate the news and results. Farmers like Jayjeet Kumar, Barati Devi and Sunita Devi shared their experiences with the authorities in Patna, and teams of two women and one man from different villages provided training and support in all 38 districts of Bihar.

"SRI is the solution to the field security issue in Bihar"

The results have been impressive. During the 2011-12 season the state's statistics showed 335,000 hectares of SRI rice, involving thousands of families. The total production of paddy in Bihar, 7.2 million tons, broke the previous state record of 4.6 million tons. Much of this increase has come from the SRI fields, where the average yields are around seven tons/ha. In the 2011 *kharif* season, Sumant Kumar, an SRI farmer in the village of Darveshpura, in Nalanda district, harvested a world record paddy yield of 22.4 tons/hectare, for which he received the Krishi Karman award from the President of India on 15 January 2013. The same prize was awarded to the Agriculture Minister of the Government of Bihar for the overall production increases in the state. We have a lot to be proud of and to look forward to in Bihar!

Having seen clear results with paddy, there was more interest to try a similar approach with wheat. Photo: Norman Uphoff

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Learning takes various forms...

Last year, West Africa faced a devastating food crisis, triggered by insufficient and erratic rains. The underlying causes include a systematic depletion of the soils, worsened by climate change. Many families and communities have taken their fate into their own hands.

In Burkina Faso, women's groups supported by the local NGO *Association Nourrir Sans Detruire* are carrying out exchange visits between villages to learn about soil and water conservation, vegetable market gardening, animal fattening, and ways to integrate moringa trees into their farms. In Ghana, the Center for Indigenous Knowledge and Organizational Development has supported dozens of women's groups from 24 communities in Northern Ghana and eight villages in the southern part of the country. These women have formed the Rural Women Farmers' Association of Ghana, and are now working to spread agro-ecological farming practices to improve production and food security. In Mali, community-based organisations and networks are scaling up the natural regeneration of trees in order to re-green the Sahel, combat climate change and regenerate livelihoods. The organisation Sahel Eco has played a central role in supporting the communities.

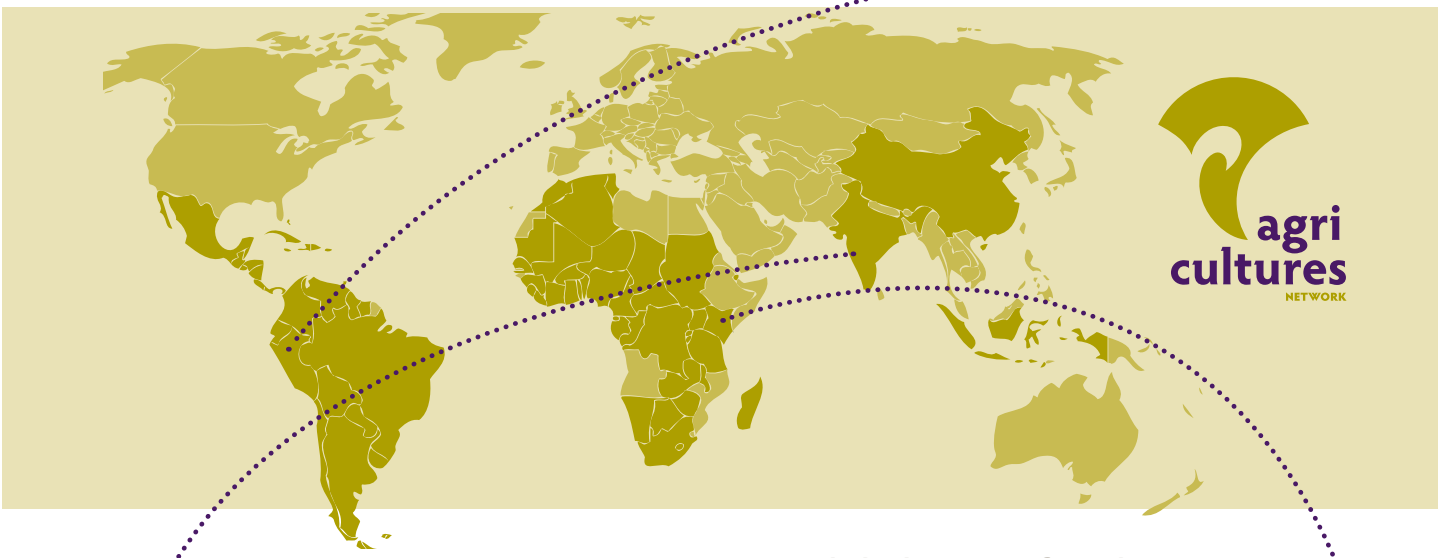
This demonstrates that if the challenges of climate change and the food crisis are to be addressed, farmers can take the lead in experimenting with farming alternatives that work where they live, and in spreading these from farmer to farmer and from community to community. At the same time, they need to develop strong organisations that allow rural citizens to shape the polices and programmes that affect them. This is why the four organisations mentioned above, together with Groundswell International, ILEIA and FoodFirst, recently embarked on a two year programme to scale up farmer-led agro-ecological initiatives to improve soil fertility, increase production and address climate change.

The initiative kicked off in January 2012, with participants gathering in northern Ghana and eastern Burkina Faso. They will identify the most promising agro-ecological practices in each ecosystem and work to spread these through exchange visits, farmer experimentation and technical support. They will engage with local policy makers to assess the advantages and disadvantages of these practices compared to conventional agricultural practices, and will push for appropriate support from governments and international programmes.

Photo: Groundswell

This is no small challenge. But it is crucial, especially in the face of climate change. With support from CCAFS, the CGIAR Research Program on Climate Change, Agriculture and Food Security, we will document in more detail the progress of this initiative. We will regularly publish updates in *Farming Matters*, and seek readers' feedback. We look forward to hearing from you!

For more information, please contact Steve Brescia, Groundswell International's International Director (stevebrescia@gmail.com) or Janneke Bruil, at ILEIA (j.bruil@ileia.org).



Our partner organisations are widely known for the regional editions of this magazine, from *AGRIDAPE* to *LEISA China*. Yet there is much more going on, with many different initiatives for disseminating information and exchanging ideas and opinions.

AME: From essays to apps

In early 2013 the AME Foundation joined the smartphone era with the new app for its flagship publication, *LEISA India*. And in addition to producing and disseminating *LEISA India* in different ways, AME has been busy with different information initiatives. To celebrate World Soil Day on 5 December 2012, for example, AME joined the Society for the Protection of Wasteland Development, one of the largest organisations in India, and arranged a workshop for school pupils and teachers in Delhi. Films about living soils, produced by different organisations, were used as resource materials, together with different editions of *LEISA India*. About 18 teachers and 60 students then participated in an essay competition. The students articulated surprisingly well how soils are linked intimately with ecological well being and rural livelihoods.

Photo: AME

A few weeks later, the city of Hubli was the scene of an international development dialogue on social entrepreneurship. AME's Director, K.V.S. Prasad was invited to speak at one of the panels, emphasising the importance of family farmers. Prasad highlighted how farmers are often neglected as a constituency, even though they make up 70 per cent of the rural population in India. The audience appreciated AME's promotion of approaches such as Farmer Field Schools as a way to motivate the rural youth, and the notion of farmers as "shareholders" rather than "stakeholders". The event made clear that agro-ecological approaches are more relevant now than ever, and that the upcoming 2014 International Year of Family Farming is a key moment to advance this type of agriculture.

ALIN: Farmers and ICTs

With support from the Ford Foundation, the Arid Lands Information Network has been piloting an online and mobile phone-based platform known as *Sokopepe*. Its purpose is to help farmers get real time information about prices and options for commercialising different products, together with a range

Photo: ALIN

of other services. Through an inexpensive SMS service that reaches the whole country, farmers can find out where to get the best price for their products. Armed with this knowledge, they can join others in order to sell larger volumes and thus ensure a higher price. Information is delivered via basic mobile phones, which are increasingly widely available. "This has enabled previously marginalised sections of society, particularly women and youth, to access market information on an equal footing with men," notes James Nguo, ALIN's Regional Director. "The growth of mobile phone technology is changing the situation we saw before, where brokers decided prices for farmers."

Once this pilot phase is complete, ALIN plans to support farmers to organise themselves into groups around various commodities in order to increase their bargaining power. The *Sokopepe* system will be scaled out to all of the 12 *Maarifa Centres* over the next two years, and will be extended to facilitate online transactions through mobile money transfers.

ETC Andes: Rural radio

Eighteen months ago, ETC Andes joined the AGROECO project in Peru – an initiative that aims to analyse the contribution of organic agriculture to food security in the Andean region. ETC Andes is in charge of disseminating and sharing the results of the project ±to students, extension agents, researchers and policy makers in the region, and to the thousands of readers of *LEISA revista de agroecología*. To better reach out to farmers, ETC has also written Quechua language scripts which have been broadcast since November 2012 by *Radio Inti Raymi*, based in the southern city of Cusco. ETC opted for a radio programme as the best way to reach those in the rural areas, especially female farmers. The first 33 programmes have already been aired, all of them discussing the link between local products and the population's health and nutrition levels. After three months, ETC organised a meeting with farmers who had been tuning to the programme. They stressed the importance of receiving information in their native language about nutrition, the meaning of organic production and nutritious recipes for dishes based on local biodiversity resources. They also requested information about gender issues. The Cusco Farmers' Federation has asked that similar programmes be made for other areas. These new scripts are ready, and agreements have been made for the programmes to be broadcast by other radio stations. They will also be available on the Internet.

Photo: ETC Andes

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Cover photo
Py Phal, SRI farmer from Prasat village, Takeo Province, Cambodia. Photo: Erika Styger

The editors have taken every care to ensure that the contents of this magazine are as accurate as possible. The authors have ultimate responsibility, however, for the content of individual articles.

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"I LEARNED ABOUT SRI FROM THE ARTICLE IN LEISA MAGAZINE IN 1999. THE TWO-PAGE ARTICLE INFLUENCED MY LIFE AND MY WORK WITH RICE, LEADING TO THE MAGSAYSAY AWARD"

Yang Saing Koma, Cambodian agronomist, founder of the Center for Study and Development in Agriculture (CEDAC). This organisation now works with 140,000 farmers, recognised as one of the main explanations behind Cambodia's doubling its rice output. He was awarded the 2012 Ramon Magsaysay Award, a prize that "honours greatness of spirit and transformative leadership in Asia". February 12, 2013.

"I have met farmers in Rwanda whose rice production has more than doubled using SRI methods. I am not sure whether this qualifies as a miracle in your eyes, but for the farmers whose production and income has increased so dramatically, I can assure you it is miraculous"

Kanayo F. Nwanze, IFAD President, at the Chatham House "Food Security 2012" conference. London, December 10, 2012.

"More efficient farming holds the key to ending world hunger... and one of the best examples is the method called rice intensification"

The ECHO Farm in Fort Myers, Florida, shows why SRI has been "a huge success" and why it is being "replicated around the world". Featured on Al-Jazeera, July 15, 2012.

"AGRICULTURE SCIENTISTS FROM ACROSS THE WORLD SHOULD VISIT AND LEARN AND BE INSPIRED BY THEM"

Nobel prize-winning economist Joseph Stiglitz , after visiting Bihar and meeting SRI farmers. Quoted in The Guardian, "India's rice revolution", February 16, 2013.

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