



Spreading the system of rice intensification across East and Southern Africa

November 2012

CASE STUDY

Enabling poor rural people to overcome poverty



**Spreading the system of rice intensification across
East and Southern Africa**

Francesca Rappociolo

Consultant IFAD

November 2012

© 2012 by the International Fund for Agricultural Development (IFAD)

The opinions expressed in this publication are those of the authors and do not necessarily represent those of the International Fund for Agricultural Development (IFAD).

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of IFAD concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The designations 'developed' and 'developing' countries are intended for statistical convenience and do not necessarily express a judgement about the stage reached by a particular country or area in the development process.

November 2012

Photo on cover page:

Women sift rice in Tsivory Village, Madagascar

Source: ©IFAD/ Rindra Ramasomanana

Spreading the system of rice intensification across East and Southern Africa

Abstract

The System of Rice Intensification (SRI) is a set of good practices that introduces a new way of farming rice to smallholders. By using less seed, land and water, the new system significantly increases yields in most cases, but at the same time intensifies work requirements at some stages.

The remarkable results obtained by farmers who adopt SRI on their land have generated processes of spontaneous replication. However, disseminating this new rice farming system has its challenges: resistance by farmers who hold on to their traditional ways; geographical and infrastructure constraints (such as frequent droughts and poor irrigation systems or unreliable supply of irrigation water); inadequate access to inputs such as seeds, organic fertilizers, and mechanical tools; and a need for extra labour (and which may be in conflict with other labour requirements arising at the same time; this is often critical as SRI requires a lot of precision in terms of the timing and type of labour at different stages of production).

The success of the SRI experience and its capacity for adaptation to different contexts has led IFAD to promote the new system in its programmes and projects. Since 1997, IFAD has successfully facilitated the spread of SRI knowledge to several countries throughout East and Southern Africa.

Spreading the system of rice intensification across East and Southern Africa

Table of contents

Abstract.....	1
Acronyms.....	3
Introduction	4
A new philosophy to intensify rice production.....	6
SRI practices	6
Spreading new knowledge in Madagascar and across the region	7
SRI in Rwanda	9
SRI in Burundi.....	10
Is SRI a panacea? Advantages and challenges	12
The future of SRI	13
Bibliography.....	15
Useful links	16

Acronyms

AUM	Association des Usagers des Marais
CIIFAD	Cornell International Institute for Food, Agriculture and Development
COSOP	Country Strategic Opportunities Programme
FAO	Food and Agriculture Organization of the United Nations
IFAD	International Fund for Agricultural Development
KWAMP	Kirehe Community-based Watershed Management Project
LEISA	Low External Input Sustainable Agriculture
NGO	Non-governmental organization
PAIVA-B	Agricultural Intensification and Value-Enhancing Support Project
PAPSTA	Support Project for the Strategic Plan for the Transformation of Agriculture
PHBM	<i>Projet de Mise en Valeur du Haut Bassin du Mandraré</i> (Upper Mandraré Basin Development Project)
PRDMR	Rural Recovery and Development Programme
PRODEFI	Value Chain Development Programme
PTRPC	Transitional Programme of Post Conflict Reconstruction
RWASAP	Rwanda Agriculture Strategy and Action Plan
SRA	<i>Système de Riziculture Améliorée</i> (System of Rice Improvement)
SRI	System of Rice Intensification
UCORIRWA	Union of Rice Cooperatives of Rwanda

Introduction

Rice is the staple food for many countries across the developing world, particularly in Asia, Latin America and Africa. It fulfils the food energy needs of around half of the world's population.¹ In sub-Saharan Africa, where 93 per cent of farm land is rain-fed, rice is a good crop alternative due to its ability to be cultivated during the wet season. Nevertheless, rice yields are severely affected by the weather fluctuations of the rain-fed ecosystems. Drought, flooding and unstable and extreme temperatures threaten the productivity of rice fields and the quality of grains.

In many East and Southern African countries, rice is a staple food for rural households. Increasing rice production is one of the most powerful pathways to improve household food security and reduce rural poverty.

In the 1980s, a Jesuit priest living in Madagascar discovered a new way of farming rice that significantly increased production. This new System of Rice Intensification (SRI) aimed to revive the natural growth potential of rice through a set of good practices that question traditional farming methods. In particular, with this new system, fields are not kept flooded. The soil is kept alternately dry or wet, allowing the plants' roots to take oxygen from the ground surface. In this way less water and fewer seeds are needed to produce the same quantity of rice. Seedlings are transplanted while very young from the nursery to the field, one by one, in square patterns to allow spacing between rice plants. In addition, the use of organic fertilizers combined with SRI practices is recommended as in many cases it gives even better results than chemical fertilizers. The reduced need for inputs (such as water, seed and chemical fertilizer) makes SRI affordable to poor smallholders, and its successes enhance its potential for replication.

In 1997, after the food crisis in Madagascar, IFAD introduced SRI in its projects in the country, starting with the *Projet de Mise en Valeur du Haut Bassin du Mandraré* (Upper Mandraré Basin Development Project - PHBM). The project successfully rehabilitated the Mandraré inland-valley lowlands by improving rural infrastructure and promoting the adoption of SRI practices. From Madagascar, SRI was brought to Rwanda and then to Burundi. IFAD and the Malagasy non-governmental organization (NGO) *Tefy Saina*, founded by SRI's pioneer, promoted the new set of practices among farmers and facilitated its dissemination through training visits across borders.

Despite its very good results, SRI is still seen as a risky practice by some farmers, and its success has not spread as quickly as expected, particularly in Madagascar. The mind-set there still clings to traditional practices for different reasons. One of them is the perception of a bigger workload for farmers who take up SRI practices. This is actually true, at least in the initial stages of adoption. However, once farmers gain familiarity with the new techniques, form farmer groups or associations, and start using mechanical tools, the individual workload for SRI decreases significantly. Often households do not have enough labour available from family members and cannot afford to pay external workers. Therefore, they remain wary of any practices that may require additional labour resources. Other barriers can be scarce access to fertilizers (organic, mineral or chemical) and inadequate irrigation infrastructure, which does not allow for careful water management in SRI's fields.

¹ FAO (2004). The State of Food Insecurity in the World (SOFI). Page 30.

Farmers who adopt SRI are usually very satisfied with the outcomes, as they see their rice yield per hectare doubling, or even increasing fourfold. However, smallholders still raise concerns about the challenges they encounter in terms of access to markets or the lack of adequate storage facilities for their increased produce.

This case study is the result of an extensive literature review, research and analysis of data gathered from the field. The analysis includes qualitative and quantitative data provided in project documentation and external sources.

The study benefited from knowledge-sharing with project staff in the field, through interviews and surveys. The contributions of the project coordinator, Mr Andrianainasoa Rakotondratsima, and former and present Country Programme Managers have been very much appreciated.

A new philosophy to intensify rice production

SRI is an innovative concept. This new system cannot be considered a “technique”. SRI is more of a philosophy based on good management of the rice plant, the soil and the water conditions. N. Uphoff describes SRI as “an innovation that encourages further innovation”. It is also an on-going innovation. The system is not a standardized methodology, but gives guidance to farmers who are willing to search for new and more productive ways to cultivate rice. Therefore farmers living in different regions with different soil, water and weather conditions can identify different cultivation methods by adapting the general SRI practices to their needs.

SRI emphasizes the revival of the natural growth potential of rice, which has been affected by traditional cultivation techniques, particularly where these rely on using and “recycling” traditional seeds, which leads to their gradual loss of productivity. This new system is not the direct product of laboratory research, even though scientists and agronomists have studied SRI practices and their results. It originated in civil society in the 1980s from the fieldwork and studies of Henri de Laulanié, a French Jesuit priest and agronomist who lived in Madagascar and worked closely with Malagasy farmers and friends to increase food security in the country by improving the production potential of rice, the staple food in the country.

Hence, SRI is a set of “good practices” to increase rice yields, derived from careful observations, with adjustments made according to needs and conditions. In line with the core idea of SRI, the same practices initially developed by de Laulanié evolved according to the actual environment in Madagascar. For example, in the beginning, SRI relied on chemical fertilizers to complement the set of practices to manage the plant, the soil and the water. The context changed as the government of Madagascar removed subsidies on fertilizers, making them unaffordable for smallholder farmers. Organic compost was then introduced as a cheaper alternative to enhance the soil’s nutritional composition, and the results were very positive. In fact, the use of organic fertilizers combined with other SRI practices enhanced yields even more than when chemical fertilizers were used.

SRI practices

SRI is based on six guidelines or practices:

- 1) Transplant young seedlings, even as young as 8-12 days old;
- 2) Create square patterns (the recommended size is around 25 cm²) and transplant only one seedling in each square pattern to allow a wide spacing between the plants;
- 3) Keep the soil moist by alternating dry (aerobic) and wet (anaerobic) soil conditions, without flooding;
- 4) Weed regularly, particularly in the first stages of seedling growth, and starting no later than ten days after transplanting the seedling;
- 5) Enhance the nutrients of the soil by using compost rather than synthetic fertilizer;
- 6) Recognize that SRI is not a standard and rigid technique but should be adapted to the needs and environment of the farmers who practice it, always keeping in mind the basic principles for its success.

Each of these practices can enhance the potential of the rice plants, but they need to be combined to result in a substantial increase in production.

Transplanting. Transplanting young seedlings is important in order to avoid losing production potential. It has been observed that this practice helps young seedlings to quickly restart their growth once transplanted. Instead, when the seedlings are transplanted when they are four or five weeks old, they will have already lost part of their potential to produce tillers. Plants should also be transplanted rapidly from the nursery to the rice field, in order to prevent the roots from drying.

Spacing. When seedlings are transplanted individually, they have more room for root growth and the rice plant can grow bigger. Distance between seedlings allows each plant to develop longer and stronger roots without competing with other plants' roots. In this way the roots can get more nutrients and water from the soil. This results in a bigger plant, with more tillers that produce more rice grains.

Keeping soil moist. SRI does not consider rice to be an aquatic plant. In fact, despite their ability to survive in flooded conditions, rice plants need to be kept humid only during the early stage of growth and tiller production. In Madagascar the adoption of SRI demonstrated that rice growth can actually improve if the soil is kept completely dry from time to time. When rice fields are not flooded (as in traditional cultivation methods) the plant's roots grow longer in order to find water in the ground. In this aerobic condition, the roots can also easily access the oxygen of the atmosphere.

Weeding. However, when the soil is kept in aerobic conditions, weed growth increases. Therefore, it is important to start weeding from the early stages of plant growth. This prevents weeds from competing with the rice plants in their search for soil nutrients. Weeding in SRI requires a heavier work load than in traditional rice cultivation methods. A mechanical tool for weeding has been developed to reduce the manual labour required. After using this tool, the weeds are left to decompose on the soil so that they can release their nutrients and minerals.

Using compost. Organic compost can replace chemical fertilizers to meet the soil's nutrient requirements. This is particularly important when chemicals are not available or reliable in rural villages. It is also an alternative for farmers who cannot afford to buy them. Certainly, preparing compost and putting it in the soil regularly is time-consuming and requires a lot of work. Nonetheless, by enhancing the soil quality, root performance improves and enhances plant growth.

Spreading new knowledge in Madagascar and across the region

Since 1997 IFAD has been introducing SRI in all of its projects in Madagascar, starting with the PHBM. Between 2005 and early 2012 more than 45,000 farmers in the country adopted SRI recommended techniques.² Agriculture is the largest economic activity on the island and rice accounts for around 50 per cent of agricultural production. It is also the staple food for most rural households. The PHBM focused on developing new areas for rice production in the arid and unproductive Mandraré region. It started with the rehabilitation of rural infrastructure,

² According to the January 2012 COSOP Review, 45,248 farmers have adopted SRI and/or the *Système de Riziculture Améliorée* (System of Rice Improvement – SRA). SRA is a variation of SRI that relies largely on the principles of organic agriculture without using chemical fertilizers (source: Shapiro B., et al., under the coordination of Benoit Thierry (2008). *Nourrir la terre, nourrir les hommes. La mise en valeur réussie du haut bassin du Mandraré à Madagascar*. L'Harmattan).

including roads and irrigation systems, and with the improvement of access to social services such as health centres, public schools and safe drinking water in the area. These infrastructure improvements combined with the adoption of SRI techniques showed very positive results. In most cases farmers quadrupled their yields from one season to the other right from the first year of adoption.³ Therefore, SRI has been promoted in a large number of IFAD projects in the country and elsewhere, particularly in Rwanda and Burundi.

Disseminating information on how SRI works is not the same as teaching a new standardized technique. As discussed earlier, the principles of SRI need to be adapted to specific contexts and experiences. SRI is based on careful observation and constant adjustment to the current conditions. The system is promoted among farmers as a set of good practices that are affordable and accessible.

Dissemination happens primarily from farmer to farmer. Organizations act as facilitators, but the role of the individual is essential. Passing on the knowledge can be a challenge due to preconceived notions and mind-sets that still hold on to traditional techniques, especially when the change concerns a crop that is so important, as rice is in Madagascar. However, replication can also be spontaneous when neighbouring farmers see the actual results of SRI-cultivated fields and show an interest in learning about it. Farmer Field Schools are a very efficient way to disseminate knowledge by showing the new system on demonstration plots through farmer-to-farmer extension. This happens often in Madagascar, and in recent years the farmer-to-farmer demonstration and knowledge transmission have become important even across countries, with the support of development organizations such as IFAD. In addition to direct demonstration, dissemination is also achieved through other channels. For example, in Madagascar, booklets and radio programmes complement demonstrations.

Although SRI was discovered over 25 years ago, it took a while before it became popular, and there is still resistance to its dissemination, especially in Madagascar. For some time it seemed that these new practices lacked scientific legitimacy as they did not issue from academia or a formal research institution. Another constraint common to most East and Southern African countries is certainly the difficulty of managing water for irrigation. In Madagascar, the resistance seems to be also due to the great importance of rice in the local culture and tradition. As the Malagasy proverb affirms, “Rice and water are inseparable from the field to the village”⁴ and farmers often do not want to be taught how to cultivate a crop that they have been growing with traditional methods for generations. In most cases, farmers consider it to be risky to farm the whole piece of land with the new and unfamiliar SRI principles. Therefore, they continue cultivating part of their land using the traditional methods. In other cases, rice fields in Madagascar hold spiritual significance, as they are considered to be the place where the souls of the ancestors rest. As a result, farmers want to keep farming them with the methods they have been using for generations.

To overcome resistance and constraints and popularize the new set of practices, IFAD has adopted a number of measures that have proven to work among Malagasy farmers. IFAD programmes and projects have invested in the development of the irrigation infrastructure to reduce water management constraints. Secondly, better-quality seeds have been introduced,

³ The Water Channel, *The Rice Bowl* (Video). Available at: <http://www.thewaterchannel.tv/en/videos/categories/viewvideo/1121/agriculture/the-rice-bowl>

⁴ French: « Le riz et l'eau sont inséparable du champ jusqu'au village ».

which has enhanced SRI results. In order to mobilize farmers a lot of preliminary work has been done to build trust between rural communities and the programme/project. A dynamic of risk-sharing has been established, where the farmer takes the risk of trying SRI on his or her plot of land and the programme/project invests money to purchase the agricultural tools that the farmer will need (such as the rotating hoe). Often these incentives have convinced volunteer farmers to form groups to try out the innovation. IFAD has supported these pioneers until they become leader-farmers. Once a small group starts practicing SRI and other farmers observe the results, the interest within the community grows spontaneously. The leader-farmers are asked by the programme/project to participate in public events (for example during market days) and share their experience with the rest of the community. Demonstrations visits are organized as well.

In this way, IFAD brings improved irrigation, improved access to agricultural tools and better yields. These benefits, especially the evidence of bigger harvests, are the key to overcoming resistance and increasing the adoption of SRI.

SRI has spread rapidly across IFAD's programmes and projects in East and Southern Africa. Ususally, SRI spreads faster where there is greater pressure on land, such as in Burundi and Rwanda. In Burundi alone, where SRI was introduced by IFAD only in 2009, it is estimated that around 18,000 farmers have already adopted it within IFAD's projects.⁵ However, it is difficult to estimate accurately how many farmers are currently benefitting from the adoption of SRI in the region. This is due in part to the disadoption that may occur in time, especially in Madagascar (because of water management constraints for example); and in part because informal/spontaneous dissemination is quite significant and often it is not reported.

SRI in Rwanda

In Rwanda the adoption of SRI is expected to contribute significantly to the food security and income of the local population.

SRI was introduced in the country in 2006, when the Ministry of Agriculture and Animal Resources launched the *Projet d'Appui au Plan Stratégique pour la transformation de l'agriculture* (Support Project for the Strategic Plan for the Transformation of Agriculture – PAPSTA), co-financed by IFAD.

PAPSTA benefited from the technical assistance provided within IFAD's country-specific grant approved in 2004. The grant aimed to support the new Rwandan government in implementating the Rwanda Agriculture Strategy and Action Plan (RWASAP). With the objective of developing pilot approaches and techniques for rural development projects, RWASAP provided SRI trainings. However, in some areas, like the Kibaza marshland, the system had not been adopted on individual farmers' plots. Therefore, Kibaza was targeted as a pilot area by PAPSTA. In 2006 the Ministry of Agriculture and Animal Resources supported the Malagasy non-governmental organization (NGO) *Tefy Saina* to go to Rwanda and train around 40 rice farmers and rice production technicians. In order to promote the spread of SRI, in 2007 PAPSTA started working in partnership with UCORIRWA, the Union of Rice Cooperatives of Rwanda. Their cooperation provided training to rice farmers from the Kibaza and Rwabutazi marshlands and helped to establish rice cooperatives in PAPSTA areas. Activities for crop intensification are

⁵ IFAD (2012). *Le Système de Riziculture Intensive (SRI)*. Brief presentation of SRI in Burundi.

currently on-going in the Cyunuzi, Kibaza and Rwabutazi marshlands, and the project is expected to close in 2013. The Kirehe Community-based Watershed Management Project (KWAMP) is spreading the application of SRI to other marshlands in Kirehe district.

Adoption of SRI in Rwanda has many critics. Diffusion of SRI practices is difficult because of a number of unfavourable conditions in the country.

A 2010 report on the use of SRI within the PAPSTA project highlighted that even if rice farmers in Cyunuzi and Rwabutazi know about SRI, there is still a considerable number of them who have not adopted it for different reasons:⁶

- Scarcity of water available in different plots and inadequate irrigation infrastructure to comply with SRI's water management requirements;
- Insufficient storage infrastructure for surplus produce;
- Scarce access to mineral fertilizers;
- Lack of regular follow-up by SRI technicians at every stage of SRI implementation;
- Resistance of some smallholder farmers to the adoption of SRI on their own plots.

Farmers often fear smaller harvests because SRI advocates using fewer seedlings on the same amount of land, a measure intended to provide each plant with adequate room to grow. Additional barriers are the increased work load for weeding and the fear of unknown risks associated with new techniques.

Nevertheless, farmers who adopted SRI in Rwanda have reported very encouraging results, especially a remarkable increase in yields.⁷ In Kibaza and Rwabutazi the yield rose from 3-4 tonnes per hectare to around 7.5 tonnes per hectare between 2005 and 2009.⁸ This was accompanied by a parallel reduction in the use of seeds per hectare, from 80 kg to 10 kg.⁹ Moreover, it is believed that the rehabilitation of the irrigation systems will enable water to be retained during the wet season, which would increase yields further.

The increase in incomes resulting from greater rice production has made it possible for farmers to access other benefits. They can now build new and solid houses, allowing them to move out of grass huts and tents. They are also now able to send their children to school.

SRI in Burundi

In Burundi, SRI is being promoted within the *Programme Transitoire de Reconstruction Post Conflict* (Transitional Programme of Post Conflict Reconstruction - PTRPC), the *Programme de Développement des Filières* (Value Chain Development Programme - PRODEFI) and the *Project d'Appui à l'Intensification et la Valorisation Agricole du Burundi* (Agricultural Intensification and Value-Enhancing Support Project - PAIVA-B). SRI was first introduced during the design stage of PAIVA-B in 2009. The newly approved project requested that the PRDMR, still on-going at that time, send a group of beneficiaries to Rwanda for training on SRI. Burundian farmers were then

⁶ Ingabire C., Ndikumana I. (2010). *Report on Knowledge and Use of SRI Method in Cyunuzi and Rwabutazi Schemes*.

⁷ Ibid.

⁸ Ministry of Agriculture and Animal Resources (2010). *Promoting innovations in agricultural sector. Knowledge and best practices on SRI (Système de Riziculture Intensif)*. PAPSTA, KWAMP. Page 24.

⁹ Ibid.

sent to the neighbouring country for field visits, where they observed SRI in practice and learned how to apply the principles. This way, when PAIVA-B started, farmers already had the knowledge they needed to adopt SRI in their fields. Subsequently, PRODEFI and PAIVA-B encouraged them to adopt SRI on a larger scale. In 2011, the projects organized a joint training of the relay technicians and the relay people¹⁰ to spread knowledge about the SRI practices among the hill-based communities.

In Burundi, the adoption of SRI practices seems to be very successful, and the results so far are also very positive. For example, in the Imbo region rice production increased from an initial 5 tonnes per hectare to 10 tonnes per hectare after SRI was adopted; in the Moso region it rose from 3 to 6.5 tonnes; and in the Buyogoma region from 1.5 to 3.5 tonnes.¹¹ In Burundi all household members perform SRI tasks. In traditional farming methods, women and children perform the weeding and transplanting. These two tasks are the most labour-intensive in SRI and must be performed quickly and frequently. Therefore both men and women of the household participate, and sometimes external labour is also needed.

As in Rwanda and Madagascar, the mind-set is sometimes an obstacle: there is a natural resistance of farmers to change or question traditional farming methods. This is especially due to the initial increase in the workload, which can require extra-household labour that farmers cannot afford. Access to fertilizers is another issue in these countries. Chemical fertilizers are not easy to find in the market and often farmers need to produce organic compost themselves. However, most farmers do not own livestock and the organic compost produced is not enough to meet their needs. In order to remove this barrier, the project makes available to farmers mineral fertilizers at affordable prices established by the Government.

Innovation: The group aspect of SRI

Scaling up SRI in East and Southern Africa has meant introducing an innovative concept to farmers rather than advocating a specific solution. The innovative aspect of SRI in Burundi is that rice cultivation is a group experience. In order to ensure the sustainability of farmers' access to inputs such as fertilizers and seeds, the project has started organizing producers in cooperatives to supply and market inputs. In addition farmers work together in a coordinated manner to perform transplanting and weeding tasks. This addresses the problem of needing extra household labour. Associations of farmers adopting SRI are growing rapidly in the country as farmers recognize the benefits that associations can bring. This also has important effects on the dissemination of SRI, as those farmers who initially resisted the new cultivation practices are encouraged by the remarkable results and are now asking to join the associations. Through SRI's participatory approach, farmers have been able to multiply their yields at least fourfold from one season to the next. Such production achievements have resulted in other benefits, as in Rwanda. Farmers are building houses, buying bicycles (to transport produce) and better fulfilling their households' nutrition needs.

¹⁰ Relay technicians and relay people (also called resource persons) are farmers who volunteer to be trained and provide extension services to the rest of the community.

¹¹ Ntiranyibagira Damase, PTRPC Coordinator (2012). *Questionnaire on SRI in Burundi*.

Is SRI a panacea? Advantages and challenges

SRI has met with many successes in many contexts. However, its adoption remains controversial. In a number of contexts, SRI has suffered from the political connotations of the formerly much debated concept of Low External Input Sustainable Agriculture (LEISA), with which some observers tend to associate it.

Overall, the advantages of this rice production system include the following:

- 1) Rice yields increase significantly, doubling or even quadrupling production per hectare;
- 2) Savings are significant because SRI requires fewer seeds and makes limited use of chemical fertilizers;
- 3) The quantity of water required is substantially lower;
- 4) Rice plants cultivated with SRI usually are more tolerant to drought;
- 5) SRI has a limited negative environmental impact¹² and also improves soil quality¹³;
- 6) SRI is a knowledge-based way of farming that does not require additional inputs or expensive additional equipment. Once farmers have learned the system they can apply it directly to their plot.

Given these benefits, SRI is seen as a more efficient and effective way of cultivating rice than traditional methods – according to SRI’s philosophy of “producing more with fewer inputs”. This explains why research on SRI extensively supports its adoption by small-scale farmers who have limited resources.

Uphoff argues that resistance to recognize and disseminate SRI’s success is often based on its counter-intuitive nature. Farmers find it difficult to accept that they can actually produce more by using less (seeds for example). Critics recognize a number of disadvantages to the application of SRI. First among them are the many requirements for careful water management. Water management and keeping the field regularly wet and drained are crucial elements for SRI to work. Therefore SRI needs some sort of irrigation structure to be in place, which may rely on government commitment and may be beyond farmers’ control. This means that SRI’s combination of practices is often difficult to apply in agricultural settings that lack a reliable system of water control. In addition, as SRI requires fields to not be kept flooded, weeds tend to grow much faster than they would when using traditional methods. The resulting increased workload creates concerns that the SRI method is prohibitively labour-intensive for poor households, especially households headed by women.

Some critics also argue that adopting SRI and extending areas under rice cultivation can compromise the production of other crops because it reduces the quantity of land available. However, SRI is often adopted on land where there is no competition with other crops. In addition, with SRI techniques, less land is needed to produce the same amount of rice. By increasing the quantity of rice produced on a given amount of land, farmers will be able to market a significant quantity of rice and use the additional income to buy other household essentials. Alternatively, they will be able to cultivate a smaller amount of land to produce the

¹² SRI reduces the time the soil is kept in anaerobic condition and the use of chemical inputs. These two practices reduce greenhouse gas emissions compared to traditionally flooded fields (Maraseni et al. 2009).

¹³ Uphoff N., Fernandes E. (2002). *System of Rice Intensification Gains Momentum*. LEISA Magazine.

same quantity of rice needed for family consumption and use the newly freed-up land for other crops such as high-value cash crops for marketing or additional food crops to further diversify their farms and improve their diets (e.g. local vegetables, onions and spices that are typically stewed and used in a range of traditional rice recipes).

In its programmes and projects IFAD has tried to address some challenges emerging from the adoption of SRI. Perception of greater labour requirements is indeed an obstacle to SRI's adoption. And often, even when the innovative practices are adopted the SRI regimen is not accurately respected. For example seedlings are not always transplanted according to SRI's recommended time frame and weeding is often irregular. In addition, climate change is increasingly contributing to the unpredictability of local weather conditions, which may affect the possibility of adequately managing soil moisture and the precision needed in terms of timing of SRI labour inputs. In IFAD's programmes and projects farmers have been encouraged to work in groups, particularly for the heaviest and most delicate tasks. This has bolstered group capacity and reduced individual workload. However, in many rural areas, there is no (longer) a tradition of working together – this too is a constraint that is often successfully addressed by the Farmer Field Schools.

The need for frequent weeding in particular is a challenge for smallholder farmers as it increases their workload and the time spent in the rice fields, and often requires the help of additional labourers. The introduction of a rotating hoe for weeding has reduced the time and physical effort devoted to weeding. When the rotating hoe is used, weeding is performed more regularly and more effectively in accordance with SRI's requirements. The spacing of rice plants too, can be greatly facilitated by the *rayonneuse*, a simple agricultural tool useful for soil preparation. If farmers cannot afford these implements, cooperatives and farmer groups can purchase them collectively.

In some cases farmers cannot or do not want to use the full set of recommended practices. SRI can be considered as an ideal combination of innovations; therefore farmers can also obtain significant results without adopting the complete set. Trials have shown that usually they can even benefit from the use of a few SRI practices that are adaptable to their particular context, their condition and their level of SRI knowledge. For example, in contexts where fertilizers of any kind are difficult to access, farmers might end up not using compost in their SRI fields and their yields still increase significantly. Indeed, some elements are more crucial than others; for example the use of compost can be considered just as an accelerator that can enhance results if combined with other practices. Nevertheless, with the adoption of the full set of SRI practices much better results can be achieved in terms of rice production.

The future of SRI

SRI is an innovation in progress. It still provokes debates and questions, particularly on how to face the challenges to its adoption in different contexts and how to ensure its success in the long term.

Organized groups at the local level have a key role in ensuring the sustainability of the new system. The establishment of Farmer Field Schools is an important element for passing on knowledge and promoting SRI innovations after IFAD-supported projects close. The efforts to reinforce the capacity of the local users associations (AUM, Associations des Usagers des Marais) to manage hydro-agricultural infrastructures will help ensure the sustainability of the

projects' achievements in the inland-valley lowlands. The organization of producers into cooperatives will create a system for sustainable marketing of surplus and the provision of farming inputs.

When the adoption of SRI increases smallholders' production, a number of challenges also arise that need to be addressed. For example, farmers in Burundi feel that they cannot take full advantage of their higher productivity because of market barriers. Even when they can sell their rice they are often obliged to do so at times when the price is quite unfavourable to them, and this affects their potential profit. Often this is due to the lack or insufficiency of adequate storage infrastructures. It is important to address the aspect of access to markets parallel to the enhancement of rice production.

A number of lessons can be drawn from IFAD's experience with SRI in East and Southern Africa. The increased workload is a major element that discourages smallholders from adopting SRI practices. The introduction of small tools, such as the rotating hoe for weeding, significantly reduces manual labour and enhances the quality of the practice. Therefore, this simple technology, which, in Madagascar, is already manufactured locally by trained artisans, can make all the difference when promoting the adoption of SRI among farmers. Associations and cooperatives need to be solid and sustainable after the project closes. Therefore it is necessary to build the capacity of farmers' organizations in administration, finance and information management. SRI is usually spread farmer to farmer through "cascade" training sessions in which a group of farmers is trained on SRI and then transmits knowledge to another group and so on. During trainings it is very important to make use of videos, images and knowledge-sharing from direct experiences. In addition, in order to ensure effective dissemination of SRI practices it is necessary to establish a monitoring system to follow up and ensure the accuracy of trainings, the respect of SRI's phases and the actual level of understanding of the innovation.

SRI is not a panacea, but it has indeed a remarkable potential for success and good opportunities for replication. It is flexible and can be adapted to different needs and contexts and farmers can pick it up easily. Despite country and landscape constraints, SRI has reported good results and farmers who adopted it are happier and satisfied. This is the key to SRI's success. SRI may not be able to be adopted everywhere at any time, but it is indeed a good choice to promote and support in those environments that are open and favourable to it. One of the biggest challenges will be to provide farmers with the tools to be able to comfortably use SRI without external assistance, and to increase their access to storage facilities and markets for the sale of surplus production.

Bibliography

Barret C.B., Moser C.M., McHugh O.V., Barison J. (2004). *Better Technology, Better Plots or Better Farmers? Identifying Changes in Productivity and Risk among Malagasy Rice Farmers.*

COSOP Monitoring and evaluation system brief, Madagascar Country Programme. January 2012.

FAO (2004). *The State of Food Insecurity in the World (SOFI).*

IFAD (2012). *Le Système de Riziculture Intensive (SRI).* Brève présentation du SRI au Burundi.

IFAD, *SRI in East and Southern Africa* (Video). Available at:

http://www.youtube.com/watch?v=AbU7_i9vW_w&feature=youtu.be

Ingabire C., Ndikumana I. (2010). *Report on Knowledge and Use of SRI Method in Cyunuzi and Rwabutazi Schemes.*

Maraseni, T., Mushtaq, S., Maroulis, J. (2009). *Greenhouse gas emissions from rice farming inputs: a cross-country assessment.* The Journal of Agricultural Science, 147 (02): 117-126.

Ministry of Agriculture and Animal Resources (2010). *Promoting innovations in agricultural sector. Knowledge and best practices on SRI (Système de Riziculture Intensif).* PAPSTA, KWAMP.

Ntiranyibagira Damase, PTRPC Coordinator (2012). *Questionnaire on SRI in Burundi.*

Shapiro B., Woldeyes A., Ramilison H., Rakotondratsima A., sous la coordination de Benoit Thierry (2008). *Nourrir la terre nourrir les hommes. La mise en valeur réussie du haut bassin du Mandraré a Madagascar.* L'Harmattan.

Stoop W.A. (2009). *"Modern" Farming and Rural Poverty. Pros and Cons of SRI.* Presentation at IFAD, Rome. Available at: <http://www.ifad.org/events/sri/>

The Water Channel, *The Rice Bowl* (Video). Available at:

<http://www.thewaterchannel.tv/en/videos/categories/viewvideo/1121/agriculture/the-rice-bowl>

Uphoff N., Fernandes E. (2002). *System of Rice Intensification gains Momentum.* LEISA Magazine. Available at:

http://subscriptions.leisa.info/index.php?url=getblob.php&o_id=12610&a_id=211&a_seq=0

Uphoff N. (CIIFAD), NGO Tefy Saina, *Comment faire pour avoir des plants de riz qui croissent mieux et qui produisent plus. Informez-vous et informez les autres.* Available at :

<http://tefysaina.org/manuelSRI.pdf>

Uphoff N., Kassam A., Harwood R. (2011). *SRI as a methodology for raising crop and water productivity: productive adaptations in rice agronomy and irrigation water management.* Paddy Water Environ.

Useful links:

NGO Tefy Saina website: <http://www.tefysaina.org/>

SRI-RICE, SRI International Network and Resources Center:
<http://sri.ciifad.cornell.edu/index.html>

IFAD operations in Burundi:
<http://operations.ifad.org/web/ifad/operations/country/home/tags/burundi>

IFAD operations in Madagascar:
<http://operations.ifad.org/web/ifad/operations/country/home/tags/madagascar>

IFAD operations in Rwanda:
<http://operations.ifad.org/web/ifad/operations/country/home/tags/rwanda>



International Fund for Agricultural Development

Via Paolo di Dono, 44 - 00142 Rome, Italy


Tel: +39 06 54591 - Fax: +39 06 5043463

E-mail: ifad@ifad.org

www.ifad.org

www.ruralpovertyportal.org

 ifad-un.blogspot.com

 www.facebook.com/ifad

 www.twitter.com/ifadnews

 www.youtube.com/user/ifadTV