

CRS Experiences with SRI in MADAGASCAR

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Catholic Relief Services (CRS) has been actively extending the SRI technical package for about three years. During 2001, the organization was provided with the first complete results of adoption and yield among program participants. Overall, SRI practices, adopting 3 of the 5 techniques, resulted in a doubling of yield over traditional practices. More complete adoption gave even better results. There is some divergence between agro-ecological regions of yield and adoption of components of the SRI package, as reported in this paper.

CRS has been working in Madagascar for the last 40 years. Since 1998, it has operated a “food security program” financed by USAID which targets vulnerable households in rural areas with an integrated package of maternal and child health assistance and agriculture improvement. The agriculture program seeks to increase food availability through sustainable increases in rice yield in target areas and sustainable crop diversification. SRI is the principal rice improvement technical package being promoted by the extension program. CRS operates its program through partner organizations in seven Catholic dioceses: Tamatave, Antananarivo, Manakara, Mananjary, Antsirabe, Tsiroanomandidy and Mahajanga. As of October 2001, there were 2,445 individuals in 210 farmer groups participating in the program.

The SRI technical package is based on the principles discovered by Père de Laulanié and extended by various organizations in Madagascar. The technical package being promoted consists of the following elements:

- Early transplanting: 8-day seedlings or somewhat older seedlings still with two leaves;
- Single seedlings, carefully transplanted and put into the soil at shallow depth (1-2 cm);
- Wide spacing: 30 x 30 cm in the main season; 25 x 25 cm in the off season;

- Early, multiple weeding: 3-4 times with a mechanical weeder, starting 10 days after transplanting; and
- Water control: applying a minimum of water, and alternating irrigation and drying fields until flowering.

Extension Approach

Training

CRS/Madagascar follows a “farmer-to-farmer” extension approach, identifying volunteer promoters at the village level. These persons are provided technical and organizational training and in turn, they provide training to farmer group members. Training sessions are practical in nature and are undertaken at the village level. Project technicians provide technical backstopping to the promoters.

Demonstrations

Each promoter installs at least one SRI demonstration plot within the village’s fields with the objective of training group members and demonstrating the value of the practices to other villagers.

Information, education and communication

In collaboration with other organizations involved in SRI extension in Madagascar (Association Tefy Saina, LDI, ADRA, and the Ministry of Agriculture), CRS has developed a series of counseling cards and a farmer booklet to enhance SRI training. The series consists of 28 cards organized along 8 principal themes: soil preparation, nursery preparation, pre-germination of seeds, transplanting, weeding, irrigation management, animation, and a comparison of SRI and traditional yields.

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NGO Report: Madagascar

The farmer booklet is designed to reinforce promoters' SRI lessons. It is an easy-to-understand illustrated manual of SRI steps, accessible to non-literate audiences. The booklet provides convenient on-hand references to farmers undertaking the technical package.

Program monitoring and evaluation

The monitoring and evaluation system began collecting farm-level rice surface and yield data on a regular basis during 2001. Results from 2000 are based on a sample relying on farmer recall. Since 2000, results are collected quarterly using a standard form.

SRI Results

Table 1 presents rice yields, number of participating farmers, and the area for which different SRI techniques are utilized by program participants.² SRI results are reported according to three levels of utilization: Level 1 consists of one or two techniques of SRI; Level 2 is three or four techniques, and Level 3 is all 5 techniques.

Discussion of results

During the first year of the project, participants were able to increase their rice production:

- Using only two of the five techniques, yields increased 16% over traditional methods.
- Using 3 or more techniques led to an 83% increase in yield.

During the second year of the project, yield increases were even more dramatic:

- Applying different levels of SRI resulted in yield increases of 56% for Level 1; 141% for Level 2; and 274% for Level 3, respectively
- Yield increases were virtually geometric as more techniques were added.

Between 2000 and 2001, even within SRI levels, increases were dramatic— 71% and 68 % for Levels 1 and 2, respectively. This can be attributed to farmers increasing their mastery of the different techniques.

Adoption of SRI techniques

The following levels of practice adoption were observed among SRI participants:

- 79% adopted the seedling spacing recommendations.
- 64% adopted the early transplanting recommendations.
- 65% adopted the one-seedling transplanting and weeding recommendations.
- 55% adopted the water management recommendations.

These adoption rates have regional variations. CRS works in three regions: the high plateau with high precipitation; the middle plateau with lesser precipitation; and the tropical/humid lowlands with extremely high precipitation.

- In the highlands, there is higher adoption of water management changes, whereas in the tropical lowlands, rice is often cultivated in marshes with insufficient drainage.
- Farmers in the highlands also more often practice wider seedling spacing.
- On the other hand, in the tropical lowlands farmers practice more weeding and transplanting at the correct age and number of seedlings. Farmers in the hot/wet lowlands are obliged to weed more frequently in order to combat the rapidly growing weeds. In the cool highlands, weed competition is less of a problem.
- Yields are also higher in the highlands with more of a tradition of fertilizing fields using cattle manure prior to cultivating. (Also, rice yields are generally higher in more temperate climatic zones compared to more tropical areas.)

Table 1. Results throughout CRS zones of intervention

	Traditional techniques	SRI techniques		
		Level 1	Level 2	Level 3
2000				
Average area (ha)	0.59	0.27	0.23	n.d.
Yield				
average (t/ha)	1.2	1.4	2.2	n.d.
maximum (t/ha)	2.5	3.0	4.1	n.d.
2001				
Adoption				
(no. of farmers)	1545	420	493	139
Average area (ha)	0.53	0.33	0.23	0.23
Yield				
average (t/ha)	1.53	2.4	3.7	4.2
maximum(t/ha)	3.0	3.2	7.5	15.0

* Based on a sampling of 10-25% of participating farmers, to have a baseline for comparison in subsequent years.

² Data for the Diocese of Mahajanga are not available and thus as not included.

Lessons Learned

- SRI is a complex technical package, as opposed to the spread of a single technique, and thus it requires more time and intensive extension efforts prior to complete adoption.
- Farmers tend to try first one or two of the techniques prior to adopting the entire package.
- Farmers have a tendency to adopt those techniques that are less labor-intensive, e.g., spacing, or techniques that are already being practiced in their area, e.g. weeding in the tropical lowlands.
- The development of good information, education and communication (IEC) tools significantly aids extension agents in their work.
- The agro-ecological diversity in the different zones of intervention demands that extension messages and IEC materials be adapted to each region.
- There is no consensus yet among decision-makers in the country regarding the appropriateness of focusing on SRI as a means to increasing rice production.
- According to program participants, SRI allows them to economize on seeds and increases their productivity while it requires increased labor, particularly for weeding.
- Implementing water management recommendations depends on not only appropriate infrastructure but also on a change of mentality among rice

farmers, who believe that rice always needs to be kept flooded.

- There is little communication between organizations undertaking SRI extension and those involved in SRI research. As such, extension services do not have the latest research results, and research organizations are not aware of the demands from the field.
- Related to the preceding point, there is little knowledge about the contribution/interaction of the different techniques in SRI and their respective and collective impact on yield.
- There is little practice of fertility management in relation to soil type.

Prospects

Given the above challenges, CRS/Madagascar recommends the following:

- Emphasize fertility management within SRI.
- Adapt SRI messages to take regional variations into account.
- Reinforce extension messages through IEC materials.
- Transmit more SRI research results to farmers.
- Get better communication between research and extension services.
- Do more systematic research on SRI in different agro-ecological regions.

Annex 1. Characteristics of CRS/Madagascar Zones of Intervention

	Zone I	Zone II	Zone III
Diocese	Antananarivo Antsirabe	Toamasina Mananjary Manakara	Tsiroanomandidy
Region	Central, oriented toward east	East	Central, oriented toward west
Altitude	> 1,000 m	Near sea level	> 1,000 m
Climate	Humid: 1,200-1,500 mm annual rainfall	Semi-humid: 1,500-3,000+ mm annual rainfall	Sub-humid: 600-1,200 mm annual rainfall
Temperature	Average : 22 ° C Maximum : 29 ° C Minimum : 04 ° C	Average : 27 ° C Maximum : 32 ° C Minimum : 10 ° C	Average : 28 ° C Maximum : 33 ° C Minimum : 10 ° C
Soils	Mineral soils, coarse and little weathered Sesquioxide and ferrallitic soils	Soils very marshy, rich in organic matter, often saturated with excess of water	Mineral soils, coarse and little weathered Ferruginous tropical soils

Source: J. Hervieu, Géographie des sols malgaches.

Annex 2. Adoption of techniques according to Zones of Intervention and agro-ecological zones				
	Zone I	Zone II	Zone III	Total
Diocese	Antananarivo Antsirabe	Mananjary Manakara Toamasina	Tsiroano- mandidy	Total
Number of SRI participants	469	138	251	858
Single seedlings	264 56%	98 71%	138 55%	500 58%
Age of seedlings	302 64%	110 79%	144 57%	556 65%
Spacing	402 86%	80 58%	200 80%	682 79%
Water management	232 49%	47 34%	193 77%	472 55%
Frequent weeding	250 53%	119 86%	135 54%	504 59%
Technique most adopted	Spacing	Frequent weeding	Spacing	Spacing
Technique least adopted	Water management	Water management	Frequent weeding	Water management

Annex 3. Analysis of results with SRI according to agro-ecological zones					
2001	Unit	Traditional Techniques	SRI		
			Level 1	Level 2	Level 3
Zone I: Antsirabe and Antananarivo (Cultivators: 598)					
Adoption	farmers	347	232	243	73
Average area	ha	0.36	0.25	0.22	0.22
Yield					
average	t/ha	2.3	3.2	4.7	4.5
maximum	t/ha	–	–	–	15.0
Zone II: Toamasina, Manajary and Manakara (Cultivators: 834)					
Adoption	farmers	739	29	109	22
Average area	ha	0.45	0.2	0.07	0.08
Yield					
average	t/ha	1.22	1.30	2.44	4.0
maximum	t/ha	–	–	–	9.0
Zone III: Tsiroanomandidy (Cultivators: 522)					
Adoption	farmers	369	159	141	45
Average area	ha	0.67	0.4	0.37	0.23
Yield					
average	t/ha	1.74	2.1	2.6	3.0
maximum	t/ha	–	–	–	18.0

Annex 4. Discussion of differences according to agro-ecological zones

Zone I (Antsirabe and Antananarivo)

- The adoption of SRI permits improvement in rice yields by 39 to 200%, with a maximum measured yield of 15 tons per hectare.
- The average level of yield with SRI Level 3 is not much different from SRI Level 2 probably because of poor management of water.
- In this zone, the adoption of techniques is, in this descending order:
 - Spacing,
 - Age of seedlings,
 - Single seedling and frequent weeding, and
 - Management of water

Spacing is easily adopted by participants in this zone where there has been intense promotion of line planting.

Agriculturalists in this zone are generally very receptive to innovations as there have been many projects and much research here. The level of participants' education is also higher in this zone compared to others.

Zone II (Toamasina, Mananjary and Manakara)

- The results obtained with SRI Level 1 are not enough to reach the objectives of the program, which is to augment rice yield by at least 10% as only an 8% increase was achieved.
- Rice culture in this zone is not very well developed, and thus there is less spread and adoption of SRI.
- In this zone, the techniques adopted are, in this descending order:
 - Frequent weeding and age of seedlings,

- Single seedlings,
- Spacing, and
- Management of water.

Management of water is more difficult in this semi-humid zone. Also, with higher average temperatures, there is rapid proliferation of vegetation and particularly of weeds, for example, *Cyperaceae*, so it is very necessary to weed frequently. These conditions are very favorable for the rapid development of young seedlings (good tillering, vigorous growth) so it is easier to plant 8-day seedlings with just two leaves here. Transplanting single seedlings is also very practical in this zone. Much of this zone is confronted with the problem of permanent soil saturation of its rice paddies, however.

Zone III (Tsiroanomandidy)

- One sees in this zone that average yield does not increase so much. SRI Level 1 yields are only about 20% above those from traditional practice. Level 3 adoption gives almost 50% more yield than does Level 1.
- In this zone, techniques are adopted in this descending order:
 - Spacing,
 - Management of water,
 - Age of seedlings and single seedlings, and
 - Frequent weeding.

In contrast to the other two zones, Zone III offers a situation where water management is more favorable. The climate is propitious for good rice culture. Given the constraint of rainfall, farmers have more incentive to manage their water resources.