

31 Raising Rice Yields and Beyond: An Experience of Collective Learning and Innovation in Lowland Rice Systems in Madagascar

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Introduction

In the late 1990s, the Africa Rice Center (AfricaRice), then called the West Africa Rice Development Association (WARDA), and partners conducted yield-gap surveys in the Sahel region of four West African countries (Burkina Faso, Mali, Mauritania, Senegal) to identify agronomic constraints to irrigated rice production. On the basis of these surveys, AfricaRice facilitated the formation of coalitions between research, extension, farmers and the private sector to develop 'integrated rice management' (IRM) options for the region (Wopereis and Defoer, 2007). Coalitions were technology specific, with teams working on mechanization, soil-fertility management and weed management. In this way, a basket of IRM options was gradually developed to address key constraints in the rice cropping cycle from land preparation to harvest. Implementation of the IRM options, particularly for soil fertility and weed management, raised rice yields by an average of almost 2 t/ha, and net benefits for participating farmers in Senegal and Mauritania by 80% (Häfele *et al.*,

2000, 2001). Similar results were obtained in Burkina Faso (Segda *et al.*, 2004, 2005). (See also Tollens *et al.*, Chapter 1, this volume.)

Irrigated systems in these areas are relatively uniform, with good infrastructure and farmers are reasonably well organized. Under these circumstances, relatively 'fixed' options and recommendations were communicated to farmers through training of extension staff and promotional campaigns (field days, rural radio).

Encouraged by the results in the Sahel, AfricaRice moved the work on IRM to rainfed lowland systems in Côte d'Ivoire. After one year of testing various soil-fertility and weed management options at different inland valley sites, however, it was realized that the diversity and variability in the conditions was too great to adopt the same approach as for the Sahelian irrigated systems. The variability of inland valleys means that farmers require flexible technologies that can be adapted to a range of growth conditions. Development of technologies needs to involve farmers at a very early stage; to ensure farmer involvement in technology development, a participatory learning and action-research

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(PLAR) approach to IRM in inland valleys (PLAR-IRM) was adopted. PLAR was originally developed for rainfed agriculture from field to village level in Mali (Defoer and Budelman, 2000).

Due to the different experiences in the irrigated systems in the Sahel and the rainfed inland valley systems in Côte d'Ivoire, AfricaRice concluded that the need to use PLAR-type approaches increases when moving from high- to low-precision systems and from relatively uniform to more diverse production systems. In Sahelian irrigated systems, technology development may be more advanced prior to evaluation by farmers, and recommendations are relatively 'fixed', which allows them to be scaled out more easily. Farmers in 'poorly developed' and variable inland valley systems, however, require more flexible technologies. Further, these farmers require greater insight into the principles of 'good agronomy' to allow them to adjust crop management to highly variable local settings. Experience in Madagascar (discussed below) demonstrates that PLAR approaches to IRM can have high pay-offs in rainfed inland valley systems.

The objectives of this chapter are to: (i) introduce principles and processes of PLAR-IRM; (ii) discuss application of PLAR-IRM in a rainfed lowland rice system in Madagascar; and (iii) describe some of the lessons learned and provide perspectives for wider use of PLAR-IRM in Africa.

PLAR-IRM Principles and Processes

PLAR is a capacity-building process based on collective learning by farmers and other rice stakeholders. PLAR starts from local knowledge and stimulates farmers to identify, try out and learn about alternative management practices. Capacity building through adult learning is acquired through careful and systematic observations, and analysis of the results obtained, leading to improved decision making.

The PLAR approach involves groups of 25 to 35 volunteer farmers who meet on a regular basis (once a week, or once every 2 weeks). The process is facilitated by staff from extension services, research institutes or NGOs. The facilitators facilitate the group learning sessions that

take place in the field or in some other convenient location. The sessions generally start before the growing season to deal with aspects related to the planning of the cropping season. During and after the rice-growing season, PLAR groups meet to discuss key crop management decisions, including postharvest issues related to storage, processing and marketing.

Facilitators play an important role as they assist PLAR groups in learning from experiences, observing, analysing, developing new ideas, trying out new options, and adapting and integrating new ways of working into current management practices. PLAR applied to IRM (PLAR-IRM) aims to develop rice management options that enhance rice productivity or quality (or both) in a sustainable manner and to integrate these step-by-step into existing cropping calendars. The options for change not only relate to technological improvements, but also deal with improved organizational and institutional practice and processes.

A PLAR curriculum for IRM was developed that is composed of learning modules, which form the facilitators' basic instruments to run learning sessions with farmer groups. The original PLAR-IRM curriculum (Defoer *et al.*, 2004) is composed of 28 modules, but – as PLAR is a flexible and evolving approach – the modules used with a specific farmer group will depend on needs expressed by the farmers themselves. The approach is open for the development and integration of new modules. The modules are supported by technical and facilitators' manuals (Defoer *et al.*, 2004; Wopereis *et al.*, 2009).

At the heart of the learning modules are PLAR-IRM learning tools that include maps, diagrams, calendars, and observation and monitoring forms. These address crop management practices and agroecological principles, but also provide basic knowledge of soils, pests and diseases, weeds, fertilizers, water management, etc. Many of these tools provide visualization of phenomena to help farmers discover and 'see' things that were previously 'invisible'. Such tools enable farmers to understand causal relationships and to identify more rational management practices, and ways of operating and organizing farming. These learning tools also provide knowledge in an easily accessible form for farmers, and can be used in a flexible way to cater for different

situations. This approach stimulates interactive learning among farmers and facilitators.

During PLAR-IRM sessions, participating farmers are encouraged to implement new ideas and technologies in part of their fields ('innovation space'). Farmers discover and learn by doing and, if needed, adapt according to their own local conditions. During the next season, farmers may apply the technique to a larger area, effectively integrating the technology into their production system and cropping calendar. Some innovations may be difficult to implement on only part of the field, e.g. improved land levelling and water management. Farmers' 'innovation spaces' are visited by other farmers during the field observations that are part of PLAR-IRM sessions. Such visits, which are followed by analysis and identification of possible ways of improvement, often generate new ideas that can be tried out by other farmers. Apart from farmers trying out innovations in their individual innovation spaces, PLAR-IRM sessions can generate ideas for 'collective' innovations, calling for the involvement of several farmers, the whole PLAR-IRM group or even the entire village community. This is often the case for innovations related to water management, or improving the general organization among farmers with respect to their position within the value chain, attempting to capture more added product value through collective storage, processing or marketing.

PLAR-IRM can be compared with the widely known farmer field school (FFS) approach, which arose from the same school of thought and paradigm (Braun and Duveskog, 2008). A major difference with the FFS approach is the layout of so-called 'best practices' in a commonly managed field in the FFS. In PLAR-IRM there is no 'commonly managed best-practices field'. Demonstrating 'best practice' may direct farmers' thinking and innovation in a direction that is being pre-established by the facilitator and that is not necessarily adapted to the local settings of the farmer because of the diversity of growth conditions and differences in crop management precision in inland valley systems. With PLAR-IRM, possible options for improvements to the rice production practices are discussed and farmers are encouraged to identify solutions for their own settings.

Madagascar Case Study

Background

In 2005, an integrated rural development project in the Sofia region of northern Madagascar (Projet de soutien de la région Sofia pour le développement rural intégré, PSSDRI) was started by the Aga Khan Foundation (AKF) to improve the revenues of the rural poor by supporting rice producers. The Sofia region is a major rice-producing area representing about 10% (300,000 tonnes) of the national production (Minagri, 2003). With an estimated population of 1.5 million inhabitants, the region has large potential to export to regions with insufficient rice production. The average yield of 1.7 t/ha is substantially below the national average of 2.1 t/ha (FAO, 2001; Bockel, 2003).

Inland valleys represent the largest part of the cultivated rice area of the region, totalling more than 80,000 ha, with only 5% under full irrigation (which enables double cropping). The major rice-growing season, from December to May, coincides with the rainy season, called *Asara*. Rice can be grown during the off-season, called *Jéby*, but only where irrigation facilities are functional.

Approach

PSSDRI activities began in May 2005 with a 2-week workshop to introduce the PLAR-IRM approach and recruit programme staff – six facilitators, a social organizer, technical supervisor, and programme director. The workshop was also attended by staff from government research and extension services and from NGOs from within and outside the region.

Field activities started in the 2005 *Jéby* season, and covered six PLAR-IRM groups in six villages in the districts of Befandriana-Nord and Mandritsara. The PLAR-IRM group facilitators in each district worked closely together and were supported by the programme director and technical supervisor. This intensive way of working and exchange among programme staff allowed for capacity building and reflection on possible adaptations of the PLAR-IRM approach to better fit the local context. In 2007, PSSDRI

adapted and republished the PLAR-IRM facilitators' manual, in collaboration with AfricaRice, to make it more relevant to the Sofia region (Defoer *et al.*, 2008).

The project's coverage increased rapidly over 4 years (Table 31.1): by the end of the *Asara* 2008/09 season, PLAR groups had been established in four districts within the Sofia region (Mandritsara, Befandriana-Nord, Port Bergé and Bealanana).

Technological innovations

Out of the wide range of technological and managerial options covering all major issues related to rice growing discussed in the PLAR-IRM groups, farmers selected those that were most relevant for them. They initially tried out these options in their individual innovation spaces, adapted them where and when needed, and then extended them beyond the initial area (Fig. 31.1).

The number of practices or technologies applied in innovation spaces and the rate at which these were extended to larger areas depended essentially on the nature of the land and other resources available. From the second year, farmers declared that they extended the innovations 'to all areas where this would be feasible' (Rowley and Dugué, 2010). The actual area depended upon their access to labour and capital, farm/field characteristics and, most importantly, water control. Access to water differed substantially from one field to another: in some cases resulting in drought, in other cases in flooding. Improving water management often required collective action.

The four most important innovations according to farmers were (PSSDRI, 2009): land preparation, transplanting of young seedlings,

transplanting in lines, and weeding using a rotary weeder. The IRM options are discussed below.

Improved land preparation

Traditionally farmers let bullocks 'trample' the field for a number of hours, creating an uneven field that is difficult to level, before flooding for one to two days and harrowing with a wooden frame. As alternatives, three innovations were introduced: 2–3 weeks of flooding (between ploughing and harrowing); harrowing with a traditional wooden frame or with a rotary harrow; and levelling of the field before transplanting. More than 90% of the PLAR farmers adopted one or more of these innovations. Flooding for a longer period was seen as an important preventive measure to combat weeds and insects, and also for making levelling easier. Farmers also reinforced field bunds to maintain water in the field. The rotary harrow was not adopted on a large scale, because it was not available or too expensive. However, locally made versions were starting to appear on the market in 2010.

New varieties and maintaining seed quality

Several new rice varieties were introduced, some of which originated from the national research system (FOFIFA), to 'complement' farmers' local varieties. PLAR farmers received small quantities of seed (200 g) during the first year when they joined the PLAR groups. More than 70% of the PLAR-IRM farmers tried one or more of the new varieties. Half of the farmers adopted variety 'Tox V' because of its high yield potential, resistance to *Rice yellow mottle virus* (RYMV) and adaptability to various water regimes. The adoption of a new variety did not lead to the old or local varieties being abandoned, as farmers

Table 31.1. Coverage of the PSSDRI project in the Sofia region, 2005–2009.

	<i>Jéby</i> 05	<i>Asara</i> 05/06	<i>Jéby</i> 06	<i>Asara</i> 06/07	<i>Jéby</i> 07	<i>Asara</i> 07/08	<i>Jéby</i> 08	<i>Asara</i> 08/09
No. facilitators	6	10	17	19	21	22	22	22
No. villages	6	17	31	38	38	58	–	99
No. PLAR-IRM groups	6	21	31	40	41	63	59	102
No. farming families	148	511	734	1274	1195	2658	1608	3782

–, no data.

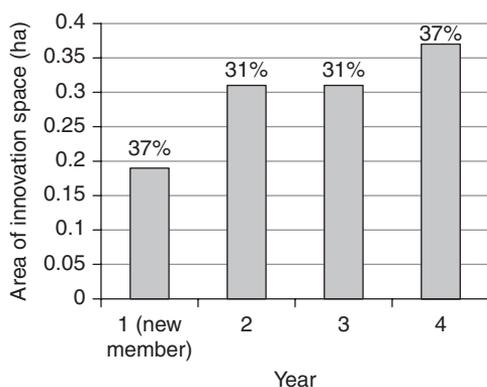


Fig. 31.1. Average area (and percentage of total field) of innovation space as a function of number of years of membership of a PLAR group; *Asara* 2008/09 data. Average area under rice per farmer was 0.56 ha.

generally preferred growing several different varieties suited to their needs. Farmers also improved seed multiplication and conservation practices by selecting an area within their field with vigorous and homogeneous plants of the desired variety, removing off-types, harvesting separately and storing under appropriate conditions.

Nursery preparation

Traditionally, farmers do not pre-germinate seed and tend to use large amounts of seed, which results in high plant density in the seedbed and thin and fragile seedlings. Farmers also establish 'dry' nurseries, outside the lowland area. Two major innovations tested were: (i) pre-germination of seed and (ii) lower seed rates in the nursery (2 kg/10 m²). These were adopted by 95% of the PLAR-IRM farmers, which led to enhanced seedling vigour and enabled earlier seedling transplanting. Creating 'moist' seedbeds in the lowland area near a water source was adopted by some farmers, but most preferred to keep the nursery outside the lowlands due to the risk of flooding.

Transplanting young seedlings in lines

Usual practice was for farmers to transplant rice seedlings that are about 4–6 weeks old, transplanting these randomly at about five or more seedlings per hill with hills about 10–15 cm apart. Innovations introduced comprised: (i) use

of younger seedlings, (ii) fewer plants per hill, and (iii) row planning and reduced hill density. About 80% of the PLAR-IRM farmers started transplanting younger seedlings of 2–3 weeks old, which gave improved tillering and increased yield. Farmers also reduced the number of seedlings per hill to two or three. More than 95% of the farmers moved to transplanting in lines on a 20 cm grid. Transplanting is often done by hired labour and, during the first seasons, transplanting in rows was sometimes hindered by lack of labourers' skill in line transplanting. However, farmers became more convinced about this option because of the ease of weeding and use of the rotary weeder. Transplanting young seedlings in lines (combined with the rotary weeder) spread rapidly beyond the PLAR-IRM farmers and in some lowland valleys almost all the rice is now being transplanted in lines by groups of women specialized in the technique.

Farmers developed an alternative to the use of a rope for marking rows, with the so-called *baobao* (or *fomby*) made of a vein of a raffia leaf with small sticks to mark where to transplant. On each extremity of the vein there is a larger stick (of 20 cm) placed horizontally to indicate the distance between the lines. The *baobao* enables transplanting in lines by one person. Moreover, the *baobao* also allows for some additional levelling.

Weed management

Weed management received much attention during the PLAR-IRM sessions as weeds are a major constraint and because their management is so labour intensive. Most farmers weeded only once each season, by hand or using a hoe, leading to large yield losses due to weed competition. As an innovation, most PLAR-IRM farmers started to flood their fields for 1–2 weeks after ploughing, allowing weeds to germinate, so they could be uprooted by harrowing. Rotary weeders can be manufactured easily by local craftsmen and were adopted by about 95% of the PLAR-IRM farmers, and by all farmers who transplanted in lines.

Soil fertility management

Fertilizer use is very low in Madagascar and particularly so in the Sofia region. The project was

initially advised by some national research and extension experts to place major attention on soil fertility as it was generally considered that low soil fertility was one of the major factors responsible for low yields. PLAR-IRM group members received a small quantity of urea for free in the first season. All PLAR-IRM farmers applied half of the dose (at a rate of 50 kg/ha) about one week after transplanting and most of them applied a second dose (at a rate of 50 kg/ha) at panicle-initiation stage. In subsequent seasons, however, when the urea was no longer provided for free, almost none of the PLAR-IRM farmers used urea. Although urea was relatively easily available, farmers were not willing to invest in it, as its benefits appeared negligible under farmers' conditions.

Water management

Measures introduced for field water management included field levelling and bunding. Collective measures were also taken, such as digging and maintaining irrigation and drainage canals. In several villages, important structural improvements to the water distribution system were made, including the rehabilitation of small dams, regular cleaning and rehabilitation of canals.

Rice yields and financial analysis

Rice yields obtained on farmers' innovation spaces averaged 4.6 t/ha over the six seasons between May 2005 and June 2009 – more than double the average yields obtained on the rest of the field (2 t/ha) and three times the average yield obtained by farmers before joining the PLAR groups (1.5 t/ha, the average yield for Sofia region as a whole). Figure 31.2 illustrates a trend of increasing average rice yields on the innovation spaces of PLAR-IRM farmers from *Asara* 2005/06 to *Asara* 2008/09, compared to the rest of their field and average yields of farmers yet to join PLAR groups.

Substantial yield increases were observed from the first season onwards. In subsequent years, increases were more modest than those of the first season (see also Table 31.2).

High yields were maintained in the innovation space and as the total area under innovation substantially increased from year 2 onwards

(see Fig. 31.1), the total production increased likewise. On average, farmers were not able to apply the IRM innovations on their entire field over the duration of the project because of the heterogeneous nature of their fields, which prevented the use of IRM innovations in some areas.

Table 31.3 presents a financial analysis of the most popular PLAR-IRM innovations introduced in the Sofia region taking into account additional costs and additional yield obtained as compared to traditional rice practices.

The net return (additional benefit/additional costs) was 10.2, i.e. for each additional dollar invested, farmers gain an average of US\$10.2. Taking into account the area under PLAR-IRM options from the second year onwards (0.31 ha), adoption of PLAR-IRM innovations resulted in a net increase in income of more than \$200 per year per farmer.

The following section discusses the methodological innovations in the Madagascar PLAR-IRM case study.

Methodological innovations

Modules

Frequent discussions and reviews among project facilitators and with farmers led to a number of important methodological innovations in the PLAR approach. The PLAR curriculum of the first implementation season (*Jéby* 2005) covered the 28 modules of the original manual (Defoer *et al.*, 2004). In the second season (*Asara* 05/06), this was reduced to 22, covering topics that were most relevant to the local situation. Some technological options were more interesting to farmers than others, in particular those related to land preparation, water management, varieties and seed, transplanting, and weed management. Not all farmers and groups had the same level of dedication to participating in learning sessions. The PLAR team therefore adapted the approach to accommodate a **high-intensity level**, covering the complete curriculum in about 25 sessions, and a **low-intensity level** with only 11 sessions, covering topics of greatest interest to farmers, plus the modules on 'planning' and 'making good observations' (Defoer *et al.*, 2008).

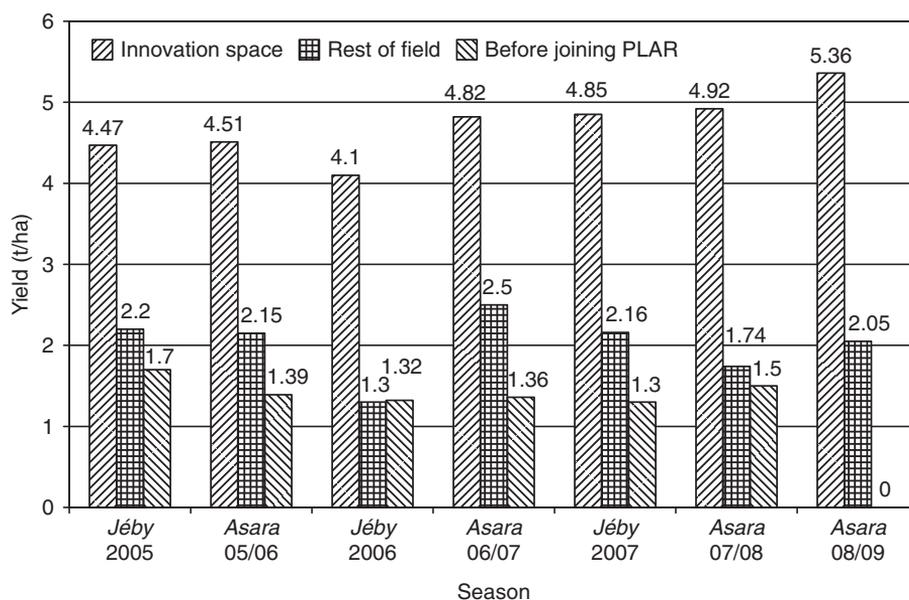


Fig. 31.2. Average rice yields obtained by PLAR-IRM farmers in the Sofia region per season.

Table 31.2. Average rice yields according to the number of years of membership of a PLAR-IRM Group, Asara 2008/09.

Location of yield measurement	Rice yield (t/ha)		
	1 year	2 years	3 years
Innovation space	5.26	5.41	5.35
Rest of the field	1.96	2.12	2.03

Farmer-facilitators

It is important to continue the group process that leads to locally adapted innovations, as many more innovations are still to be developed and fine-tuned for further increasing yields and moving beyond yield to a value-chain approach. It is, however, also clear that there is a need to disseminate knowledge to larger numbers of farmers.

Involvement of project-appointed facilitators in PLAR-IRM groups was, therefore, gradually reduced because of the substantial time commitment and the need to start scaling out the results obtained and to reach farmers not directly involved in the PLAR-IRM groups (Table 31.4). Continuous presence of project-appointed facilitators at

PLAR-IRM sessions was limited to three consecutive seasons: season 1 covering 11 sessions; season 2 covering the same topics and potentially some new ones; and season 3: development of a new learning programme by the group.

During season 2, 'candidate farmer-facilitators' were identified and asked to lead some of the discussions. During season 3, the project-appointed facilitator handed over some sessions to these farmer-facilitators, thereby coaching and providing support on the job as needed. For the fourth and subsequent seasons, the project-appointed facilitator assisted the group in developing its own learning programme, but no longer participated in the sessions, which were run entirely by the farmer-facilitators, who could bring in expertise for certain topics as they saw fit. The project-appointed facilitator assisted in the closing session to help the group evaluate the programme and develop ideas for the subsequent season.

Scaling out

Working with PLAR groups is time consuming and intensive and the team therefore developed alternative ways of involving larger numbers of

Table 31.3. Financial analysis of performance of PLAR-IRM innovations (per hectare).^a

Items	Cost or income (\$)
A. Additional costs	
A1 Seed	13.89
A2 Land preparation	
A2.1 Labour (harrowing and levelling)	5.00
A2.2 Depreciation of harrow	22.22
A3 Line transplanting	8.33
A4 Weed management	
A4.1 Labour	8.33
A4.2 Depreciation of weeder	11.11
A. Total	68.89
B. Additional produce value	
3100 kg (= 4600 – 1500)	775.00
B. Total	775.00
C. Net benefit (B–A)	706.11
D. Net additional benefit/additional cost	10.2

^aBasis for calculations: A1: 40 kg of improved seed at \$0.83/kg, to be renewed every 5 years (\$8.33) + additional cost for on-farm seed production (\$5.56); A2.1: 3 days labour @ \$1.67/day; A2.2: cost of harrow = \$222.22, depreciated over 10 years; A3: 5 extra person days @ \$1.67/day; A4.1: 5 extra person days @ \$1.67/day; A4.2: cost of weeder \$56.56, depreciated over 4 years; B: value of additional produce = average yield obtained through farmer innovations over the six season/years (4600 kg/ha) minus the average yield of the region under traditional practices (1500 kg/ha) × area under innovation (ha) × \$0.25/kg (\$1 = MGA1800).

Table 31.4. Involvement of facilitators in PLAR-IRM groups.

Season	Modules	Role of project-appointed facilitators and farmer-facilitators
1	11 'fixed' modules	Project-appointed facilitator leads
2	11 'fixed' modules + other modules of groups' choice	Project-appointed facilitator leads and hands over every now and then to 'candidate farmer-facilitators'
3	Group develops own programme	Project-appointed facilitator starts Farmer-facilitators identified Handing over regularly to farmer-facilitators
4, 5, etc.	Group develops own programme	Project-appointed facilitator assists in planning and evaluating programme and occasionally assists in learning sessions Farmer-facilitators lead

farmers. Rice growing is knowledge intensive and simple extension methods may not be very efficient. The project team opted to develop a 'condensed' training programme for farmers. This training programme was organized for farmers in villages where no PLAR groups existed and where there was no plan to set up PLAR groups, including zones with limited accessibility during the rainy *Asara* season, because of floods. The programmes took 4 or 5 days and brought together about 40 farmers from villages neighbouring a village where a PLAR group operated. Training was organized

during the off-season (*Jéby*), when the project-appointed facilitators, who led this process, were in principle not directly involved with the PLAR groups.

This 4–5 day training (called *formation-diffusion*, F-D) included interactive workshops and fieldwork related to those topics that the farmers of the PLAR groups identified as most relevant. The curriculum used during the training week aligned with the PLAR philosophy in terms of adult experiential learning principles. It is important to organize such training weeks in villages and sites with neighbouring PLAR

groups, as this allows for effective interaction between the trainees and the PLAR members. Although the project-appointed facilitators took the lead during the training week, in practice farmer-facilitators from the nearby PLAR group contributed to the training sessions. The project developed visual aids (animated cartoon-type brochures and videos) that helped the farmer-facilitators in their work, and also served the trained farmers when they returned to their villages. On returning to their villages, trained farmers organized video sessions for their colleagues and encouraged them to implement some of the innovations shown. The farmers also received a copy of the brochures for further reading. The trained farmers formed a kind of relay between the project and the rest of the villagers; project-appointed facilitators visited at least once a year, together with a member of the monitoring and evaluation (M&E) section of the project to investigate the effectiveness of the use of the extension materials and its effect in terms of application of new technologies and of yield increases. The F-D programme started in *Jéby* 2009 and involved about 4500 farmers. Similar numbers were involved in *Jéby* 2010 and 2011. Preliminary results of a survey indicated that, overall, 31% of F-D trained farmers had adopted at least one IRM practice. The adoption rates were higher in zones and districts where PLAR groups were actively involved during and after the training sessions. Highest adoption rates, among those farmers who had practised IRM, were for a combination of line transplanting of young plants and weed management techniques (AKE, 2011).

Conclusions and Perspectives

The Madagascar case study shows that PLAR-IRM in rainfed rice systems can have a fast and lasting impact on rice yields. The innovations that farmers eventually adopted required in some cases an increase in labour, but this was not seen as a major hurdle.

PLAR-IRM is a time-consuming approach, but for highly diverse systems with low management precision it will deliver concrete results as illustrated in this case study. It is important to think about scaling out of results to other farmers

from an early stage, and to develop 'condensed' curricula and easy-to-use learning tools for farmer trainers who will train their colleagues. Video and other tools may be used to scale out essential messages (such as in-line transplanting and the use of a rotary weeder) to farmers outside the project zone.¹

In the fourth year, PLAR-IRM groups moved from production issues to postharvest and marketing constraints and credit provision, while project facilitators handed over to farmer-facilitators. PLAR groups continue to function even several years after being 'weaned' (i.e. after the project). In most cases, the weaned PLAR groups formed part of an 'operational centre'. These centres are now being organized into formally registered associations that have access to credit services for their members and organize seed and equipment services for their members.

At project level, the benefits of the additional rice produced as a result of project work vastly outweigh the costs of running the project. A simple calculation based on the modest estimation of \$200 net income increase per year per farmer and the number of farmers involved in the groups (3780 in *Asara* 2008/09), provided a net figure of \$747,400 value added. Compared to the local project costs of about \$300,000/year (Rowley and Dugué, 2010),² a benefit-cost ratio of more than 2 is obtained. These modest estimations do not include the extra rice produced by farmers who were involved in the F-D programme and who have adopted IRM practices, or the value added through activities related to storage and postharvest handling of rice. They also do not take into account the considerable enhancement of human and social capital in the communities involved in the project.

The impressive results that can be obtained, as shown in the case study of Madagascar, clearly invites more widespread use and adoption of PLAR-IRM. However, there are important conditions for making things happen. PLAR is quite demanding in terms of time and facilitators' investment. Also any advisory service interested in implementing PLAR should be dedicated to capacity strengthening, above the interest of promoting any technological option for improvement. As we have outlined, PSSDRI adopted a flexible PLAR approach in which farmers themselves discovered what was best for them, what

areas needed innovation, and how to innovate. This way of working is unique, however, and many advisory services might face constraints in putting so much effort on strengthening farmers' capacities, in learning together and having confidence in this learning process and in the validity of its outcomes. What is central in PLAR

is not what the advisory service believes is good to be promoted, but what the farmers and their groups bring out and innovate. This demands a real paradigm shift and to make it happen organizations should be ready to 'cultivate' real farmer empowerment and refrain from promoting and pushing technologies.

Notes

¹ A video series of six episodes was made on learning about improved rice management practices in a typical PLAR context, where farmers learn from each other and through exchange start putting in place innovations: *The Rice Growers Dream* (http://www.akdn.org/videos_detail.asp?Videoid=103).

² Note that this figure does not include cost of AKF Geneva staff supporting the project, or the costs of ad-hoc consultants.

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